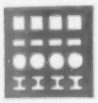
THE IRON AGE

Special Articles

The deoxidizing properties of vanadium in steelmaking, as discussed in a Russian study, are presented in "Vanadium as a Deoxidizer," starting on p. 97. The equilibrium constants of vanadium in liquid iron are outlined; also given are the relative merits of vanadium and silicon as deoxidizers. "How Oldsmobile Uses Induction Heat for Forging," appearing on p. 81, describes a method that claims better results in forging die life, savings in raw material, lack of scale, ease of stock handling, and cleanliness in the forging preheating process.

Issue Highlights



Will steel prices rise? There is not likely to be any general price boost this year but next year may tell another tale when insurance and pension costs begin to make themselves felt. What are some of the higher cost factors since the last steel price rise and what is happening to steel company earnings? These all affect the answer.—p. 113.

Despite the strength in steelmaking scrap prices a runaway market is not expected at this time. Fluctuations have been wide and speculation rampant. The conversion deal is back too. But steel mills have heavy enough inventories to resist the fantastic prices of 1948.—p. 117.

Many automobile manufacturers see a period of confusion ahead because even if their own steel needs are met their suppliers may run into trouble. A hectic round of conversion activity is predicted.—p. 121.

Efforts of the New England states to locate a steel mill there will undoubtedly get a boost from the Democratic party at its New England conference, scheduled for Boston next week. The Quebec-Labrador ore development will be put forth as an inducement and the St. Lawrence Seaway will again be supported by the party.—p. 50.

Coming Next Week

Greater freedom from cracking in intricate sections, less distortion in heat treatment, a minimum of size change, and uniform through-hardening are some of the claimed advantages of air-hardening tool and die steels in comparison with other steel types, as described in an article appearing next week. Part one of this three-part article separates these steels into three classifications based upon analysis and usage, and also outlines the mechanics of the air-hardening process.

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Editorial

INDUSTRY VIEWPOINTS

Hurrah For The Joneses

UNBEKNOWNST to many urban salesmen and market research men a revolution in buying habits among farm people has been going on for the past 2 or 3 years. Farm buildings, machinery and other cost savers on the farm have been provided for. But there is another angle that is one of the mainstays in purchasing power levels of the postwar era. The farmer's wife is on a buying rampage.

When I was upstate New York in the Penn Yan-Hammondsport-Watkins Glen-Dundee area recently the farmer was not looking for a depression. A friend of mine who has a furniture store in Bath, N. Y.—a gathering place for farmers when it rains or on Saturday—tells me the lineup of purchases is: Inner spring mattresses, low priced electric ice boxes, new stoves, kitchen furniture, washing machines, home freezers and dishwashers.

Salesmen often play second fiddle in this buying spree on the nation's farms. What sells more items than salesmen in the small farm and village areas is that old American custom of "keeping up with the Joneses."

Better sales effort, more aggressive promotion and a recognition of the "Joneses" would mean that farm buying is slated for greater and greater expansion. Manufacturers will need to revise their sales potential figures. But the Joneses on the farm have their counterpart in industry.

Who are the Joneses in industry? They are the ones who take chances. Who know that business means risking a loss as well as expecting a profit. They try something new. They don't pay too much attention to the prophets of doom. They sell and sell and sell.

They junk old machinery for new. They produce items at the lowest possible price so they can sell to the greatest number. They are pushovers for manufacturers who have new machines and new ideas. They keep the wheels going. They act as pacesetters for the others who don't want to get lost in the shuffle. They leave most economic gobbledegook to the experts.

It's a good thing for us we have the Joneses on the farm and in industry.

Tom C. Campbell

Editor

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USS

UNITED STATES STEEL

► Though they won't commit themselves, some machinery builders have begun to wax more optimistic after taking a look at October orders. In some cases October business has topped July, August and September. This may foreshadow a better general manufacturing cycle for next year.

► The steel conversion deal, principal prop under the fantastic steelmaking scrap prices of 1948, now looms as a new threat to the scrap market. But observers do not expect the current steel shortage to compare with that of 1947 and early 1948. Therefore, unless other inflationary factors go to work, scrap prices are not expected to reach 1948 highs.

► The Navy has developed a rugged high speed drum camera for recording signals on a cathode-ray oscillograph. Film on a rotating drum takes a continuous picture at speeds from 10 to more than 100 ft per sec.

► White hope of foundries in some areas is the potential business in diesel engine parts. The changeover from steam to diesel locomotives still has quite a spell to run. (With about 30,000 steam locomotives on Class I roads, the diesel engine market has been estimated at some 20,000 units, in addition to the 10,000-odd now in service). Wide awake iron foundry sales staff are watching the market like hawks. However, developments in new steam power could change this picture somewhat.

► Future Air Force bombers will be fitted with parachutes to slow them down on landing. Some guided missles will have them too. The adoption follows tests on the XB-47 Stratojet. One purpose is to cut maintenance costs on tires and brakes.

► Today's vehicles are getting about a third more ton-miles per gal of gasoline than they did 20 years ago, according to GM's "Boss" Kettering. He adds that high compression engines already tested show possibility of further gains of 35 to 40 pct using higher octane fuel.

► Some unusual cases of pitting in galvanized steel pipe in corrosive natural waters have been reported, due apparently to a change in the usually accepted electrochemical relationship between zinc and iron. One possible cause of this reversal of potential in the zinc-iron couple is attributed to temperature. Studies are now under way to find out how to eliminate these few exceptions to the usually long life of galvanized pipe.

► Inflation note: a Wall Street house is putting on an intensive mail and telephone campaign to sell gold. Current price of $44 per oz for 85 pct gold content figures out to the equivalent of about $37.50 per oz of refined metal, or $2.50 above the Treasury buying price.

► The Swedes have developed a technique for hardening razor blades after they are packed. The process is the well known deep freezing method for converting the austenitic particles into harder martensite.

► A major automobile manufacturer will switch to Periodic Reverse plating of bumpers on its 1950 models and two others are considering the move. The technique, also referred to as reverse current plating, drastically reduces polishing and buffing costs and yields an exceptionally durable chromium finish.

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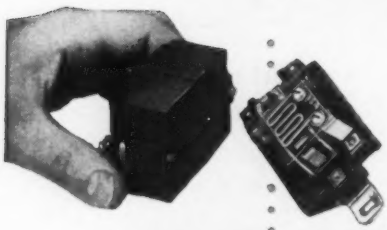
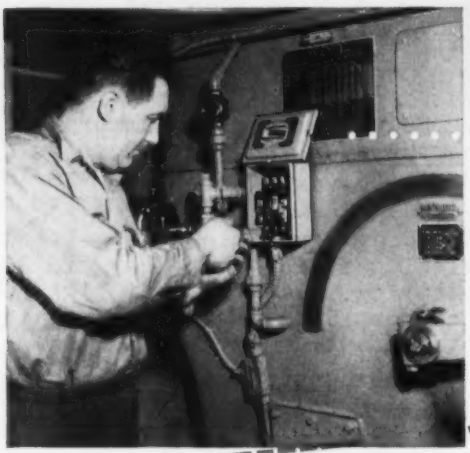


.... feature quick, easy installation; positive overload protection with long-life bi-metallic relays; easy wiring and servicing because terminals are wired from the front. Application—fractional and integral motors up to 7½ horsepower.

The CR1061 controls a handkerchief ironer in a modern laundry.

The CR1062 is easy to mount and wire. Used here on a coolant pump.



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GENERAL ELECTRIC

Most Mills Booked for Months

Steelmaking Rate Soars to 61.5

Scrap Rises in Strong Market

The Iron Age SUMMARY

IRON AND STEEL INDUSTRY TRENDS

WITH more than 95 pct of the nation's steel mills back in production early this week on a tremendous backlog of orders, 1949 will see far more steel produced than the industry made in any prewar year. Output of raw steel for this year is expected to top 76.5 million tons, or 20 pct more than the industry produced in 1929.

From the way their customers are ordering, steel sales executives feel reasonably certain that the strike did not last long enough to pinch off the business revival that appeared to be with us when the steelworkers struck on Oct. 1. A number of big mills are booked solidly through next June on hot and cold-rolled sheets. All major products are being allocated to customers on a quota basis as they were last year.

Coal Not a Problem Now

With only a few exceptions coal stocks at the mills are now big enough to cause no concern to production men for the rest of the month. They'll worry about another coal strike on Dec. 1 when and if it comes. The problem will be possible diversion of steel company coal stocks to institutional and other power plants if the miners walk out again in December.

The steelmaking rate for this week is scheduled at 61.5 pct of rated capacity, up 36.5 percentage points from last week's revised rate of 25 pct of capacity. At Buffalo, where the major producer started up on Nov. 1, the rate for this week is 101 pct of rated capacity. At Cleveland it will zoom from zero to 69 pct of capacity in one week. The industry as a whole will not come back this fast but this terrific pickup shows what is being done at many plants.

In the race to get back into full production the industry is expected to hit a rate close to 80 pct next week. Operating men at most major mills are aiming at 100 pct operations before mid-December, so the rate for that month should top 90 pct of capacity.

Steel buyers, particularly those in Detroit, are redoubling their efforts to line up conversion steel. This is the technique they used so well last year. It means buying ingots from one source and shipment of the semifinished product to one or more other mills for conversion into scarce sheet steel. Almost all steel companies were engaged in one or more phases of it last year, helping steel starved customers and making a nice profit to boot. But it adds as much as 50 pct to the delivered cost of steel sheets and in effect means higher steel prices to fabricators who use it.

Steelmaking Scrap Moves Higher

The conversion deal has not yet affected the scrap market, though it will if it keeps growing. Even without it the price of steelmaking scrap has been climbing steadily. In Cleveland and Youngstown No. 1 heavy melting steel was up $6 and $3 a ton respectively. The market was stronger in Pittsburgh, in the East, and at St. Louis, and moved $2 a ton higher in Birmingham.

Because scrap inventories at steel mills are bigger now than they were early in 1948, observers don't look for the runaway market that prevailed then. Speculation has been rampant, however. While strong efforts are being made to hold prices in line there was no assurance that steelmaking scrap would not go higher in the near future.

Foundries Are More Optimistic

Foundries are beginning to see signs that the business pickup they experienced in August and September will return as soon as the big metal users get back to capacity. Farm implement and auto demand is expected to bounce back but heavy castings for the railroad and heavy machinery fields are not promising. Because many of the merchant pig iron furnaces ran during the steel strike iron is not yet in tight supply. Resumption of coal mining on Nov. 10 saved some merchant furnaces from early curtailment.

Gray market offerings continue at anywhere from 6¢ to 9¢ a lb on sheets and some ingot makers are beginning to ship conversion steel to rolling mills. Hot-rolled sheets are being offered from conversion steel at $120 a ton in Chicago.

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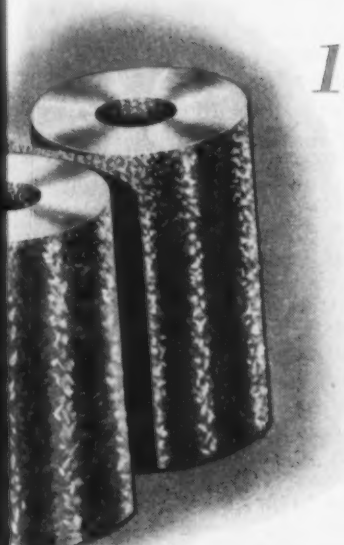

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Fatigue Cracks

By *Charles T. Post*

Sound

One of the happiest triumphs of science over nature to come to our attention recently has allowed a sweet young thing to meet her fellow man with confidence.

Nature, in an evil mood, pitched the gal two strikes. Her form was as flat as the prairie, and her sweaters might as well have been stretched over the boxes they came in. As if this weren't bad enough, she became increasingly hard of hearing, which to a woman is a tragedy second only to losing her voice.

She investigated various types of hearing aids, but all of them required a conspicuous piece of apparatus. This badge of her handicap seemed a worse affliction than not being able to hear. Then, browsing in the shop of a modiste one day, inspiration struck suddenly.

With the help of a salesgirl, she selected an ample pair of falsies—ample, that is, so that one of them could conceal her hearing aid without a trace. Popularity followed quickly, and she fairly beams as she turns up the volume so as to overhear the whispered admiration of the men in the office where she works.

Aptronym

William F. Sherman, as manager of the engineering and technical department of the Automobile Manufacturers Assn. is convinced that the automobile is here to stay but keeps one eye on the airplane. Thus, he nominates W. Nelson Bump, regional sales vice-president for American Airlines, to membership in the aptronymists.

Mr. Bump is granted a limited membership, good only in rough flying weather.

Nomination of Mrs. Benjamin H. Cribb, the new Seattle bride, by Charles C. Finn, was voted tabled for consideration some time in the future.

Best Sellers

If you're inclined to peel back the literary veneer of the reading public, one way to do it is to read the trade papers circulating to newsstands.

The culture of the land, we'd always believed, was nurtured by the women and girls while the menfolk toiled in the mines. But according to the newsies' bible:

"Thrilling Love, formerly published monthly, now is bimonthly like its two companion magazines, Exciting Love and Popular Love—a best selling trio for sis and mom."

"Also for the teenagers the picture form of romantic adventure now so tremendously popular, wherein the story is told in pictures and words, are My Love Memoirs (10¢), My Secret Romance (10¢), My Secret Affair (10¢) . . . and Secret Love Stories (25¢)."

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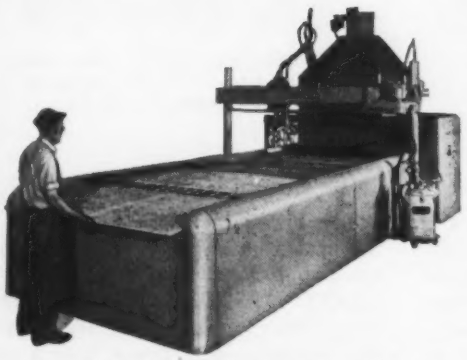
Putting Air to Work... with Artistry!



This horizontal transverse automatic spray machine is a typical example of DeVilbiss engineering skill. It is capable of coating up to 9600 square feet of wall board every hour.

Artistry in the skillful use of air enables the trumpet player to produce beautiful harmonious tone patterns rather than blatant, discordant noise.

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Iron Age *Introduces*

DAVID T. MARVEL, general sales manager of the Western Brass Mills Div., Olin Industries, Inc.

JAMES W. KIRKPATRICK, chief metallurgist in Youngstown district, Youngstown Sheet & Tube Co.

EUGENE M. SMITH, flat-rolled product development engineer, Youngstown Sheet & Tube Co.

David T. Marvel has been appointed to the newly created position of general sales manager of the Western Brass Mills Div. of OLIN INDUSTRIES, INC., East Alton, Ill. Mr. Marvel comes to Western Brass Mills after nine years as manager of sales with the Tubing Specialties Div. of the National Tube Co., Gary.

H. F. Finnell, Jr., has been named Pacific Coast sales manager for the PHELPS DODGE COPPER PRODUCTS CORP., Los Angeles. Mr. Finnell will make his headquarters in Los Angeles.

Ross Crutcher has been elected credit manager of the NICHOLS WIRE & ALUMINUM CO., Davenport, Iowa. Mr. Crutcher was credit manager for the Paraffine Companies, Inc., Eastern Div., at Somerville, N. J., prior to his new appointment.

L. F. Carlson has been named executive assistant on the administrative staff of the Oldsmobile Div. of GENERAL MOTORS CORP. Mr. Carlson was formerly national merchandising manager and will continue to advise on merchandising programs. **R. E. Gifford** has been appointed advertising manager, and **O. F. Frost** sales promotion manager of the division.

Walter G. Koch has been elected president of INTERNATIONAL STEEL CO., Evansville, Ind., succeeding **Henry Bohnsach** who has been named chairman of the board. **Wesley D. Hamilton** has been appointed vice-president and director of sales.

Theodore H. Oppenheim has resigned as director of research for the New Idea Div. of AVCO MFG. CORP., New York.

Eugene M. Smith has been elected flat rolled products development engineer for the YOUNGSTOWN SHEET & TUBE CO., Youngstown. Prior to his association with the company, Mr. Smith was a research engineer at Battelle Memorial Institute in Columbus, Ohio. **James W. Kirkpatrick** has been named chief metallurgist. Mr. Kirkpatrick was formerly with Carnegie-Illinois Steel Co., Homestead works, and later with H. A. Brassert & Co., New York City.

Marvin W. Smith has been elected a director of the WESTINGHOUSE ELECTRIC CORP., Pittsburgh. Mr. Smith is president of the Baldwin Locomotive Works. For 33 years before becoming a Baldwin executive, in 1948, Mr. Smith had been employed by Westinghouse in various capacities.

C. F. McBRIDE, traffic consultant, Pittsburgh Steel Co.

R. N. SHIELDS, general traffic manager, Pittsburgh Steel Co.

G. GREER COOLIDGE, director, Blaw-Knox Co.

G. Greer Coolidge was elected a director of BLAW-KNOX CO., Pittsburgh. Mr. Coolidge is senior vice-president and a director of Harbison-Walker Refractories Co., Pittsburgh, and also a director of Fidelity Trust Co. Mr. Coolidge will fill the vacancy on the Blaw-Knox board occasioned by the death of the late **Donald C. Bakewell.**

Lemuel N. Bruhoe has resigned his association as vice-president and works manager of the RIVERSIDE METAL CO., Inc., Philadelphia.

James M. Arroyo has been appointed sales manager of the MARTIN MACHINE CO., Kewanee, Ill. Mr. Arroyo became associated with the Martin sales department several months ago to head export sales. For the past 15 years he has been connected with domestic and export sales supervisory work.

Charles F. McBride has been named traffic consultant of PITTSBURGH STEEL CO., Pittsburgh. **Richard N. Shields** has been named general traffic manager. Mr. Shields was formerly assistant traffic manager of the company.

William A. Hays has been appointed district manager of the New Orleans district of the replacement tire sales division of the B. F. GOODRICH CO., Akron, Ohio, succeeding **Donald E. Lagarde** who has been transferred to a similar post in Atlanta. Mr. Hays comes to his new post after serving as general supervisor for the New Orleans district.

Thomas Hannah, Jr., has been appointed manager of the central business contact department of the AMERICAN RADIATOR & STANDARD SANITARY CORP., Pittsburgh. Mr. Hannah has been associated with American-Standard for the past 22 years, and prior to his new appointment was manager of the Washington sales office.

Lawrence V. Britt has retired as chairman of the board and of the executive committee of BURROUGHS ADDING MACHINE CO., Detroit. Mr. Britt will continue as a director of the company.

Chester M. MacChesney has been named chairman of the board of directors of the ACME STEEL CO., Chicago, succeeding the late **Charles S. Traer** in this position. Mr. MacChesney is executive vice-president of the company.

C. J. Stites has been appointed assistant manager of sales and export sales manager of the CLEVELAND TWIST DRILL CO., Cleveland, succeeding **H. P. Jenson** who died. Mr. Stites has been with the company for 12 years and has been promoted from the field sales division. **R. O. Artner** succeeds Mr. Stites in the field sales division.

Winston I. Parks has been named research and public relations director of ADAMS STEELE, INC., Chicago. Mr. Parks formerly for 6 years was research director of Benge Associates.

Edgar C. DeSmet has been named to the newly-created post of director of body engineering for WILLYS-OVERLAND MOTORS, INC., Toledo. Mr. DeSmet has been at Willys 13 years, serving the company in various capacities.

F. P. Rogers has been named representative in Oregon and Washington for the Butterfield Div. of UNION TWIST DRILL CO.

William C. Bruton has been appointed district sales manager for American Manganese Steel Div. of AMERICAN BRAKE SHOE CO., New York, and **Robert H. Elem** has been appointed Pacific Coast manager of the Welding Products department. Mr. Bruton, formerly sales engineer, first joined Brake Shoe in 1916. Mr. Elem, formerly welding engineer, is a member of the American Society for Metals and the American Welding Society.

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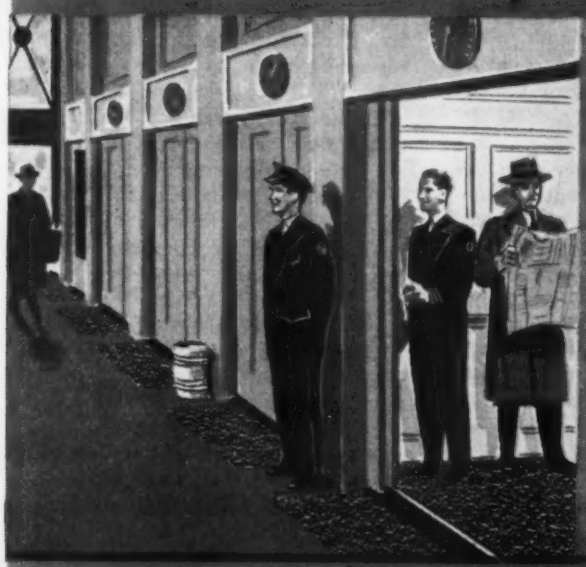
Non-Slip . . . Even on Steep Inclines.

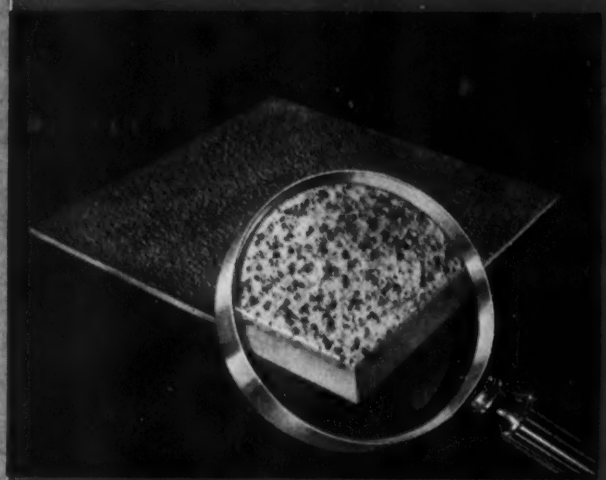
Magnification shows even distribution of abrasive grain particles.

Elevator sills and floors of A. W. ALGRIP afford passengers maximum protection.



HAS OVER 1001 PLANT AND PRODUCT USES

Now, for the first time you can put an end to dangerous, costly slipping accidents, that steal thousands of dollars and countless manhours from industry, with A.W. ALGRIP Abrasive Rolled Steel Floor Plate. It's the non-slip floor plate that Safety Engineers, Architects, Railroad Superintendents, Public Utility Managers, Plant Owners and Purchasing Agents have always wanted.



A.W. ALGRIP is made by rolling abrasive grain uniformly as an integral part of the upper portion of steel plate. It retains its non-slip qualities for a lifetime, because as the surface wears, new abrasive particles are constantly exposed. Get more information about this new, "safety" floor plate. Write for booklet or use coupon on opposite page.

A.W. ALGRIP

Product of **ALAN WOOD STEEL COMPANY**

CONSHOHOCKEN (19), PA.

Other Products: Permaclad Stainless Clad Steel • A. W. Super-Diamond Floor Plate • Billets • Plates • Sheets • Strip (Alloy and Special Grades)

SLIPPING ACCIDENTS

A.W. ALGRIP The Abrasive Rolled Steel Floor Plate

WET OR DRY IT KEEPS MEN'S FEET SAFE AND SECURE

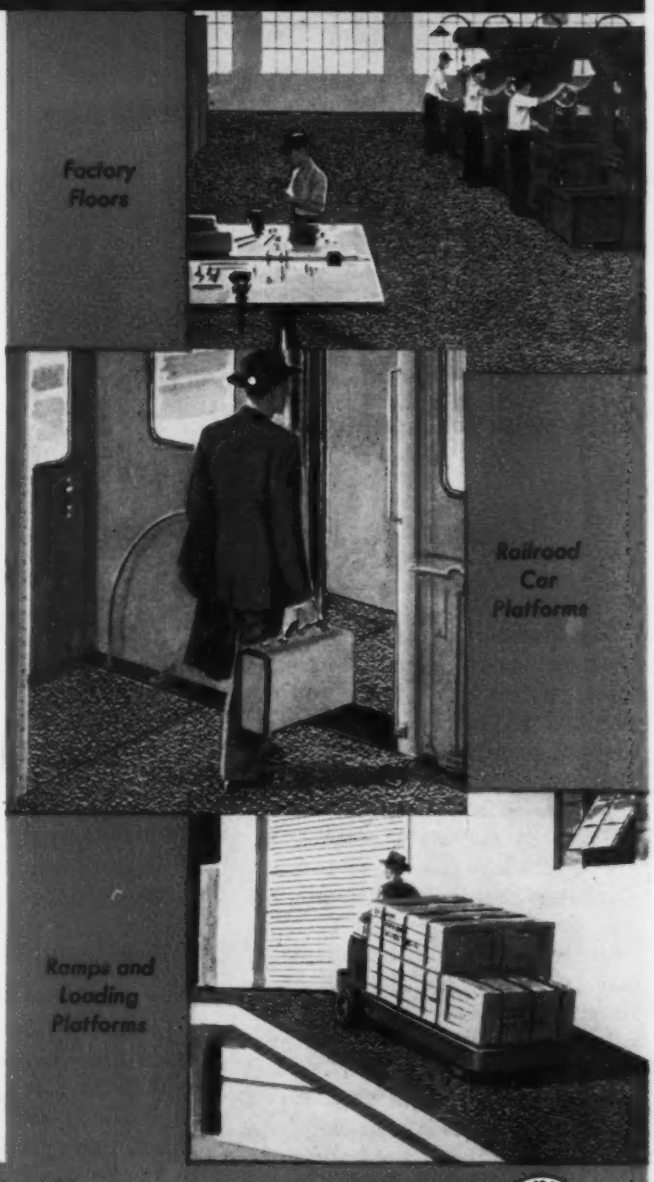
The non-slip properties of A.W. ALGRIP are present under both wet and dry conditions. Slipping is almost impossible as the abrasive particles in A.W. ALGRIP hold fast keeping men's feet safe and secure.

Applications

There are hundreds of "safety" applications for A.W. ALGRIP on railroad rolling stock, aboard ship, on busses, trucks and vehicular equipment.

Power plants, refineries, commercial and industrial buildings also have many applications for A.W. ALGRIP. And this truly non-slip floor plate is ideal for use on ponderous construction equipment, road machinery, concrete mixers and all stationary and mobile structures.

Because A.W. ALGRIP is rolled steel, and, therefore, stronger than other abrasive flooring, thinner sections may be used having greater load carrying capacities.



THERE'S NEVER A SLIP ON **A.W. ALGRIP**

SEND FOR THIS HELPFUL BOOKLET TODAY. USE COUPON.

A.W. ALGRIP ABRASIVE ROLLED STEEL FLOOR PLATE

A Product of **ALAN WOOD STEEL COMPANY**

CONSHOHOCKEN (19), PA.

Gentlemen: I am interested in A. W. ALGRIP. Please send me your 8-Page Booklet.

NAME_____

Company_____

Address_____ City_____ State_____

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GLOBAL LETTER

REVIEW OF WORLD MARKETS

Brazil's newest iron and steel plant is built in the center of its raw materials . . . Nationalization of industry has not brought public control.

Sao Paulo—Itabira Special Steel Co., the most recently founded steel producer in Brazil, was authorized at the end of October to exploit a deposit of manganese covering an area of 1190 acres in Itabira, Minas Geraes.

The iron and steel works is being erected in an ideal location alongside the company's valuable iron ore beds. The blast furnace, which was practically completed last year, will be the largest in Brazil to use charcoal for fuel. It will be supplied from the surrounding forests, which extend over 55 sq miles and yield about 10 tons of charcoal per acre. As timber is cut the cleared areas are recovered with eucalyptus trees, of which 170,000 were planted in 1948.

Mill Will Be Ready in '50

The company has its own power supply, derived from neighboring falls, with a capacity of 35,000 hp. The power station is well advanced and much of the subsidiary work, including the building of roads and warehouses, is already completed.

The steel mill, lamination plant and foundry will be ready early in 1950. Machinery and equipment to the value of $3,300,000 has been received from the United States and an equivalent amount has been acquired in Brazil. The total expenditure to the end of 1948 was $11,588,000.

The president of the company, Percival Farquhar, is well known in international mining circles. He has recently been decorated for his services to Brazil.

Had American Backing

In 1920 he obtained the backing of an American financial group to exploit the Itabira iron ore deposits, build a railway to serve the mines, equip the port of Victoria to handle the ore and install iron and steel mills. A contract was obtained in the name of the "Itabira Iron Ore Co.," but owing to intense opposition the concession was only approved by both Federal and Minas Geraes State governments in 1928.

Before the company's shares could be launched on the New York, Paris and London markets the 1929 world crisis caused a general restriction of investments. Initial operations were delayed beyond the period stipulated in the contract, rendering the latter liable to cancellation, and the government which came to power after the Brazilian revolution of 1930 demanded a complete revision of the contract.

Subsequent negotiations were difficult and protracted and finally, in 1942, the rights of the company were taken over by the Brazilian government and the "Companhia Vale do Rio Doce" was formed to exploit the mines. Mr. Farquhar then obtained the concession to exploit the ore at Colonel Fabricio and formed the present company.

Industrial Nationalization Has Not Brought Public Control

London — There is a growing recognition that in the industries now nationalized public ownership has not brought with it public control. The British Iron and Steel Federation contrasts the position of the industry under the postwar setup and its probable position under nationalization.

Until recently the iron and steel manufacturers operated under the Iron and Steel Board, which watched the industry from the consumers' viewpoint and with an eye to the national interest, but with no direct control over the day to day working of individual operators.

No Control Over Efficiency

It points out in the first place that there is no control over efficiency in a nationalized industry. Since a nationalized industry has no competitor there is no standard by which efficiency can be judged.

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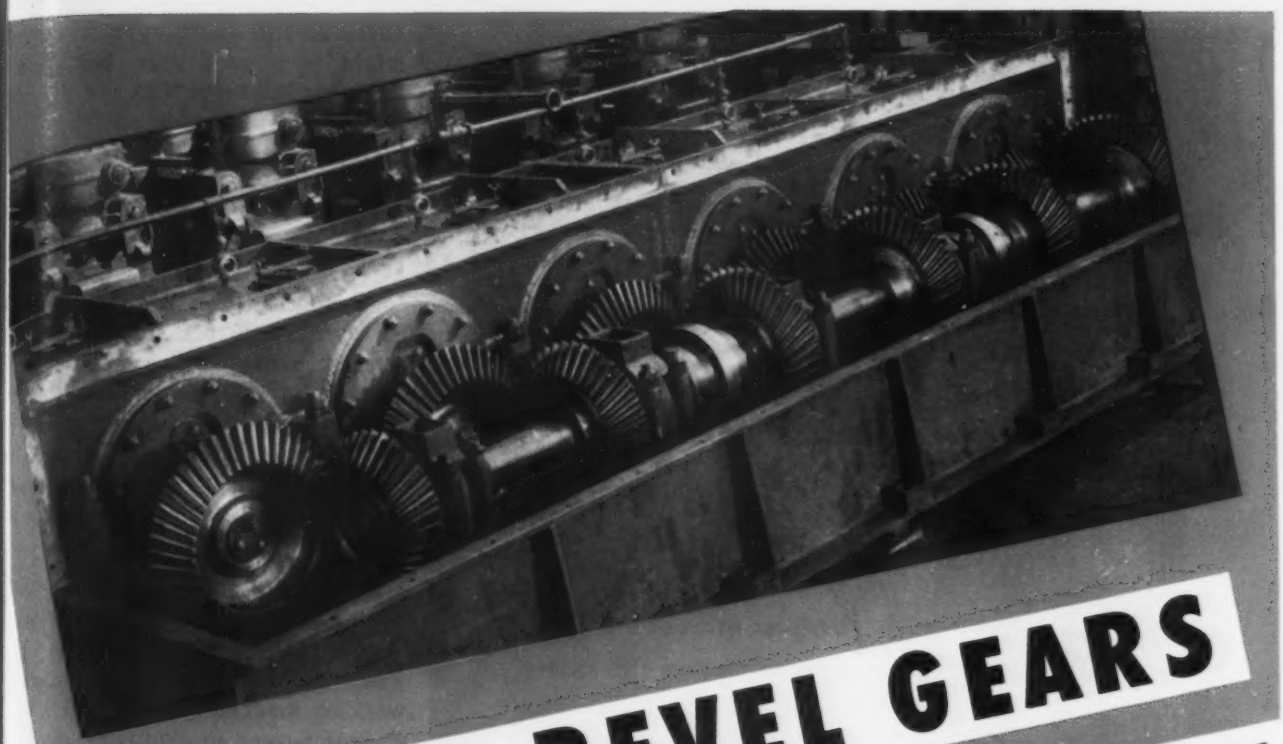


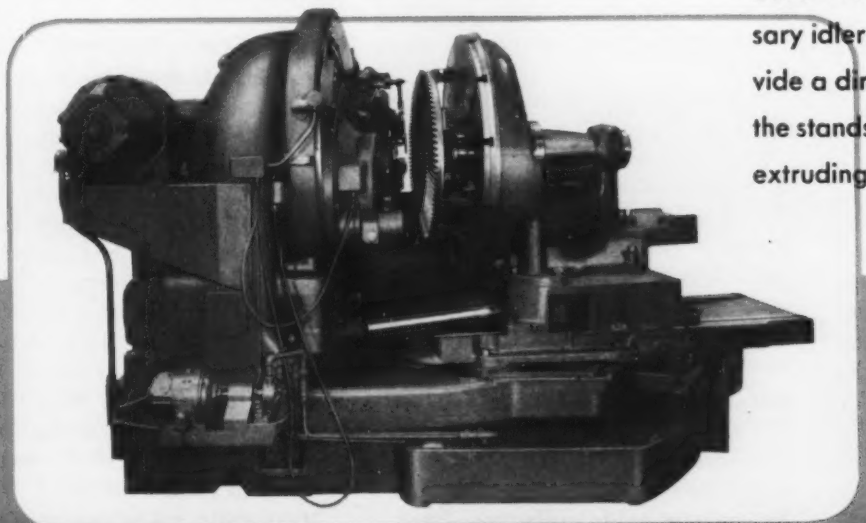
GLEASON BEVEL GEARS

CARRY HEAVY LOADS WITH COMPLETE RELIABILITY

IF YOUR POWER TRANSMISSION PROBLEM IS ONE OF
LOAD, SPEED OR ANGLE

Remember!—Bevel gears to transmit power and motion can be produced to satisfy *any* angular drive requirement without limitations as to load, speed or shaft angle.

Bevel gears have proven again and again their ability to handle the loads commonly found in heavy industry. For example, the 10" steel rod mill is a compact unit requiring a minimum of floor space. The right angle spiral bevels reduce the need for unnecessary idler gears in the gear train, provide a direct transmission of power to the stands and carry the heavy load of extruding with unfailing service.



Spiral bevel gears used in the steel rod mill were cut on the Gleason No. 60 Spiral Bevel and Hypoid Generator.

Let us assist you with your bevel gear designs. The correct bevel gear, properly mounted, is your assurance of long-lasting trouble-free service.

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1000 University Avenue
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Builders of Bevel Gear Machinery for Over Eighty Years

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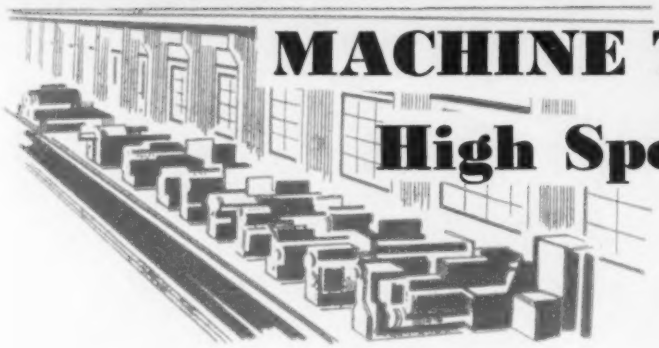

MACHINE TOOL High Spots

Sales Inquiries and Production

by William A. Lloyd

Pickup in new order volume gains momentum . . . Foreign business prospects promising . . . Overall market still spotty.

Cleveland — Restrained optimism, prompted by a substantial pickup in new order volume during the past few days, was gaining momentum in the machine tool industry this week.

Major segments of the industry in New England, Cincinnati, Cleveland and Detroit reported orders from various sources, including automotive, government, certain capital goods industries and foreign customers as the predicted fall revival in the machine tool business, which was made dormant by the steel strike, began to display definite signs of life.

European Prospects Better

Simultaneously, reports from representatives of some segments of the machine tool industry who went abroad for first-hand appraisal of the result of devaluation, indicated this week that the European market situation for the average U. S. machine tool builder is not as ominous as it originally appeared.

For example, the British recently raised prices on some lines 15 pct. Some foreign dealers have been pressing for increased discounts, generally without success, and the British move ends on some lines the temporary price advantage that devaluation provided.

Market Undertone Stronger

While foreign order volume is not expected to return to pre-devaluation levels for several months, indications are that substantially more foreign business is available than was apparent a month ago. An underlying reason for the lull in foreign orders some companies are presently feeling is that some foreign buyers bought to the limit in anticipation of devaluation.

A possible clue to the generally stronger tone of the domestic machine tool market this week is the projection of certain segments of the steel industry, indicating capacity or near-capacity operations until late spring. As one observer put it. "If the steel business is going to be that good, how can the machine tool business be so bad?"

Future Still Uncertain

This week the machine tool business is strong in spots. The order spread is anything but even, but as one sales executive—hard put to estimate his fourth quarter order volume—commented, "The men in the field are too pessimistic on an up-swing and too optimistic on a down-swing. Next year might be a good year, but then again we might be lucky to do 70 pct of 1949. Take your choice."

Contract tool and die shops' September volume continued the modest upturn which began in July, registering a 10 pct increase over August. Sales invoiced for the 9 months through August were reported at 86 pct of 1948. September volume was less than 5 pct below the 1949 high point in March. Orders are down somewhat, according to trade sources, but the volume is higher than spring and early summer.

French Study U.S. Methods

In Washington, Economic Cooperation Administration announced that 21 representatives of France's machine tools and metalworking machinery industry will make a 6-week productivity study in the U. S., starting Nov. 16. The group, which consists of management representatives, engineers, foremen and workmen, is headed by Louis Champetier, director of machine tool experiment station organized by the French Ministry of Industry and Commerce.

The group arrived here Nov. 10. Approximately the first half of the study will be devoted to plant visits and seminars in Cincinnati. The remainder of the tour will consist of visits to industrial plants in other areas, including Washington, D. C.

Detroit Trade Optimistic

In Detroit, most trade sources are optimistic about business conditions during the balance of the year, despite any adverse effects of the steel and coal work stoppages. While GM is quiet at the moment and Ford buying is limited, Chrysler tooling activity has been most encouraging, according to local machine tool sources. While all Chrysler divisions have been active recently, most of the activity has centered at the Chrysler and Plymouth divisions, according to local sources.

Meanwhile, there has been some Packard buying, apparently aimed at relieving tight spots in the line. For the moment, automatic transmission talk has been rather quiet.

How Sid Birkland Learned about J&L Warehouse Service

J&L STEEL

A true story with a moral

It was 2:45 P.M. on a Saturday. All the steel warehouses in town were closed, and Sid Birkland, owner and manager of the A&B Machine Works, Chicago, was in a tough spot. He needed a steel shaft, 3½ inches in diameter and a little more than 7 feet long. And he needed it *quick* for machining and installation before Monday morning. Otherwise production in a customer's plant would be stopped.

Sid had called four steel warehouses, and the only answer he got was: "Sorry, we are closed on Saturdays." Then he 'phoned Art Hoover, J&L Warehouse salesman—at home. Art, realizing the spot Sid was in, went into action.

Art called Gus Strueck, the J&L Warehouse foreman, who was about to go shopping. Together they started for the warehouse, wondering how they were going to handle the heavy bar—get it from the stock rack to the power saw. On the way, they spotted Bernie Faille, the shipping clerk, all dressed-up going to his sister's wedding. Bernie knew how to operate the crane!

. . . So, because three loyal J&L employes put a customer's needs before their own convenience, the steel shaft was ready by the time Sid's truck arrived—and on Monday morning, Sid's customer had production rolling as usual. Incidentally Bernie Faille arrived at the church in time to see his sister married.

Reenactment of a scene at J&L's Chicago Warehouse, when J&L employes, Art Hoover, (wearing hat) Bernie Faille, (in crane cab) and Gus Strueck (standing in truck) took time out on a Saturday afternoon to help A&B Machine Works out of a tight spot.

An exceptional case? Sure, but a very good example of what J&L Warehouse SERVICE can mean to you when you're in a tough spot.

Moral: Better join the Sid Birklands, and see what it means to have good steel service *when you need it!* Besides, you are sure to like J&L Steel that is *quality controlled from raw material to finished product.*

JONES & LAUGHLIN STEEL CORPORATION

★ J&L WAREHOUSE:—"A DEPENDABLE SOURCE OF SUPPLY" ★

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FREE — USE POST CARD

PUBLICATIONS

New publications that describe money saving equipment and services are available free and without obligation. Copies can be obtained by filling in the attached card and mailing it.

Sheet Metal Forming

A sheet metal fabricator with the new Hydra-New-Matic head that operates at 165 strokes per min is described and illustrated in Catalog 10-A. Specifications of the new unit are included. *Wales-Strippit Corp. For more information, check No.* 1 *on the postcard.*

High Temperature Alloys

High temperature nonferrous alloys for jet and turbine parts and other applications are described in 72-p. Mg-Zr. alloy catalog. *Howard Foundry Co. For more information, check No.* 2 *on the postcard.*

Fire Extinguisher

The new Alfco dry chemical fire extinguishers are described. The chemical is nontoxic, noncorrosive, nonconductor of electricity and will not freeze. The new unit has the U/L label and is rated B-1 and C-1. *American-La France-Foamite Corp. For more information, check No.* 3 *on the postcard.*

Hydraulic Tubing

Bulletin 38 gives technical specifications and pressure charts for the selection of seamless steel hydraulic tubing. *Superior Tube Co. For more information, check No.* 4 *on the postcard.*

Goggles-Lens

Industrial protection devices and accessories are described in Catalog No. 49. Spectacles, goggles and plastic shields, as well as respirators, welding helmets, facelets, face shields, and air analysis equipment are described and illustrated. *Willson Products, Inc. For more information, check No.* 5 *on the postcard.*

Gear Service

Helical, bevel, worm, spiral, spur and ground thread worm gear service is described in a 4 p. brochure. The use of various types of gears is described and illustrated. *Perkins Machine & Gear Co. For more information, check No.* 6 *on the postcard.*

Heat Treating

The scientific control of steel treating, including flame and induction hardening, normalizing, nitriding and other heat treating methods are described and illustrated in a 12 p. booklet. *Lakeside Steel Improvement Co. For more information, check No.* 7 *on the postcard.*

Welding Head

Auto arc welding heads and controls, designed for open, shielded or submerged arc welding with either ac or dc current are described in a 4 p. pamphlet. Easily installed, the units are light, accessible, compact and interchangeable. *Auto Arc-Weld Mfg. Co. For more information, check No.* 8 *on the postcard.*

Stud Welding

A new 8 p. booklet on stud welding describes the speed, strength, and economy of welded studs, and the portability and operating ease of the equipment. A variety of applications are illustrated and described. *Nelson Stud Welding Div., Morton Gregory Corp. For more information, check No.* 9 *on the postcard.*

Press Brakes

The PT series of press brakes are described in a new 4 p. brochure. Feature of the brakes, including overload protection, slide areas, die areas, accessibility, etc., are shown. *Cyril Bath Co. For more information, check No.* 10 *on the postcard.*

Casting Patterns

Nonferrous castings and wood and metal pattern operations are described and illustrated in a new 16 p. catalog, No. 50. Data covers magnesium and aluminum alloys, copper base alloys, and other information on brass, bronze and Ampco bronze castings. Chemical composi-

Turn to Page 167

WHEELABRATOR* USER FINDS

TRU·STEEL Shot

Lasts 5 to 6 times as long as ordinary shot"

Established 1913

GRAY FORGINGS & STAMPINGS LIMITED

MANUFACTURERS

WRENCHES, HAMMERS, FORGINGS and STAMPINGS

CABLE ADDRESS: "GRAYWRENCH," TORONTO
BENTLEY'S CODE

ST. CLARENS & ROYCE AVENUES
TORONTO 4, CANADA

July 18, 1949

Gentlemen:

We are using a 27" x 36" Wheelabrator for cleaning alloy steel forgings after annealing and after heat treatment for plating. TRU-STEEL shot cleans work in the same length of time or less than ordinary shot, and the surface produced is very satisfactory for plating or painting.

We find TRU-STEEL shot lasts from 5 to 6 times as long as ordinary shot.

Blades used to last at the most 50 Wheel hours with ordinary shot--with TRU-STEEL approximately 400 hours.

Our wheel has been operating over 800 hours at this point perfectly satisfactorily.

In general TRU-STEEL shot costs half as much as ordinary shot, cuts down on maintenance and costly parts with less shot handling and storage.

All parts in the machine have a peened appearance rather than an erroded wear appearance, due to TRU-STEEL shot not breaking down into any angular particles. The dust collector is emptied 1/3 as often.

Yours very truly,

GRAY FORGINGS & STAMPINGS LIMITED

Peter B McCurdy
Metallurgist.

test after test TRU-STEEL shot has proved superiority over the best of the "old-standard" abrasives, because it lasts much longer, reduces machine maintenance costs, increases the life of machine parts, and saves storage space and shipping costs. Savings like these are reflected in surprising reductions in cleaning costs per ton.

Responsible for TRU-STEEL's eye-opening performance are these exclusive features: (1) round and solid; (2) hard and tough; (3) a fine true steel that has received a full heat treatment, not just a draw or anneal; (4) wears down, does not break down; (5) accurately graded and controlled as to quality and hardness.

TRU-STEEL is the answer to the long-felt need for a superior abrasive that would afford top performance and economy. On the basis of its performance in actual satisfaction we are confident that it is the abrasive you will use tomorrow . . . *why not investigate it today?*

GET THE FACTS - Write for complete details!

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Mfd. by Steel Shot Producers, Inc., Butler, Pa.

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NEW

PRODUCTION IDEAS

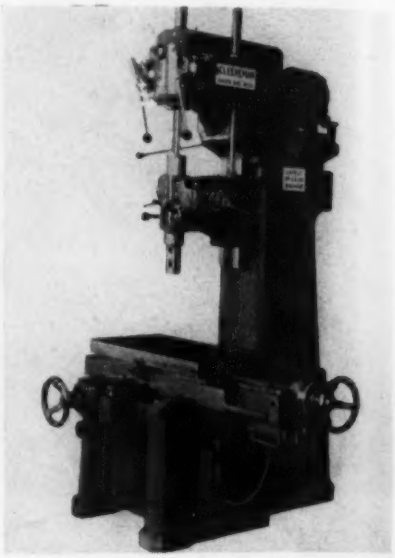
Continued

teeth during the lapping operation. Gears may be lapped conventionally or diagonally on the new machine.

Conventional lapping may be selected for wide faced gears by locking the work table in line with its direction of reciprocal travel. Lap speeds and table feed are mechanically controlled. *National Broach & Machine Co. For more information, check No.* 29 *on the postcard on p.* 37.

Layout Drilling Machine

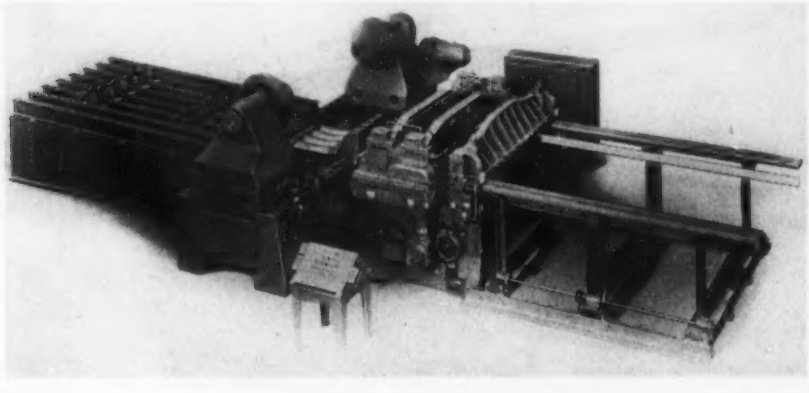
A new layout drilling machine handles work that requires more accuracy and facility than is possible with a drilling machine and yet does not require the extreme precision of a jig borer. The machine besides drilling, boring, tapping, reaming and milling, is applicable to tool work, plastic, rubber or diecasting molds, and to blanking, punching, forming and drawing dies. It has a combination boring and drilling spindle with No. 4 Morse taper with lifetime lubrication. The spindle quill is chrome plated and the rack is ¼ pitch. A spindle binder on the sliding head and a retaining key slot in the spindle nose provide for milling operations. Movements of the saddle and table are controlled by precision lead screws accurate to 0.0001 in. in any inch. Work tolerances can be held within 0.001 in.



per ft. Six-in. diam micrometer dials are graduated to 0.001 in. and verniers to 0.0001 in. Power rapid traverse to table movements is an optional feature. *Cleereman Machine Tool Co. For more information, check No.* 30 *on the postcard on p.* 37.

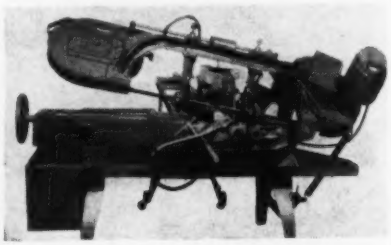
Automatic Shear

The Cleveland automatic shear has a loading table, automatic uncoiler, roll feed and stacker synchronized to operate as a combined unit. The shear, which is single geared and equipped with an electrically controlled air-operated jaw type clutch, operates at a speed of 60 strokes per min. The loading table accommodates two coils at a time, that are released one at a time and are advanced by gravity feed over rubber covered rails. The automatic uncoiler handles coil stock from 12 to 96 in. wide, 72 in. OD, 16 to 30 in. ID, 20 tons in weight. The roll feed consists of five straightening and four feed rolls and is equipped with a variable speed measuring device that can be set for shearing material from 12 to 148 in. long. The stacker unit is adjustable by hand ratchets. The shear is available in various sizes and capacities. *Cleveland Punch & Shear Works Co. For more information, check No.* 31 *on the postcard on p.* 37.



Bar Stock Feeder

A new automatic bar stock feeder converts horizontal metal cutting band saws into fully automatic cut-



off machines. This device, known as the Wells-O-Bar Feed Master, attaches easily and without interference with normal operations of the saw. Projection of material in various sizes and shapes, accomplished by an air actuated spiral roller drive, together with positive air control of saw frame during each cutting and resetting cycle, makes the multiple cutting action completely automatic. Maximum length of multiple cuts is 18 in. and cuts can be made to within 5 in. of the end of stock. A safety device trips on the last piece to shut

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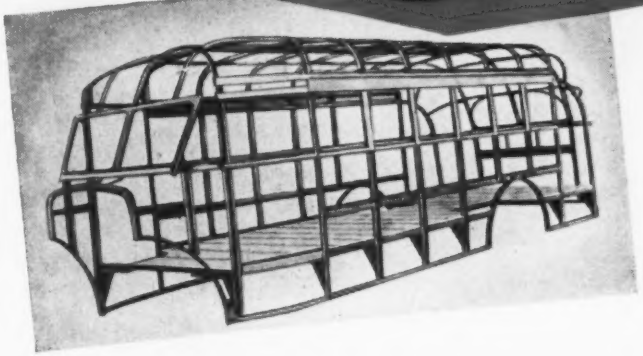
FRAMED and COVERED with safety

Pictures courtesy of Oneida Products Corp.



The greater strength and toughness of N-A-X HIGH-TENSILE steel permits weight savings of up to 25% in section—and still affords maximum protection against injuries from traffic accidents.

Its superior fatigue-resistance and excellent weldability prolongs this safety-factor . . . reduces maintenance costs over more miles and under all conditions.

If you manufacture a product requiring high strength, toughness and good weldability, it will pay you to investigate N-A-X HIGH-TENSILE.

MAKE A TON OF SHEET STEEL GO FARTHER
Specify—
N-A-X
HIGH-TENSILE STEEL

GREAT LAKES STEEL CORPORATION

N-A-X Alloy Division • Detroit 18, Michigan
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On the ASSEMBLY LINE

AUTOMOTIVE NEWS AND OPINIONS

Steel strike precipitates shutdowns in auto industry . . . Pontiac says its dealer stocks are far below prewar level . . . New tires have curb guard . . . Wind tunnel tests show air drag on U. S. cars.

by Walter G. Patton

Detroit—The automobile industry was breathing a little easier this week even though its hopes for avoiding extensive shutdowns in November and December were apparently doomed to failure. Recent strike agreements by U. S. Steel, Great Lakes, Bethlehem, Jones and Laughlin and Republic will undoubtedly help the Detroit steel situation appreciably.

Steel Strike Will Hurt

The consensus here is that the effects of the steel strike are bound to be felt in Detroit for at least 3 or 4 months, assuming John L. Lewis does not precipitate another crisis early in December when his present strategy of calculated benevolence expires. Mr. Lewis, it was felt, was throwing industry and the public a bone. But the Great Master was fully prepared to snatch it back at his pleasure—and probably would do so when the proper opportunity for heroics arrived. The auto industry could scarcely hope to build solid scheduling plans on a situation which Mr. Lewis appeared to control so completely, it was argued.

Detroit Outlook Gloomy

The production outlook for Detroit is not encouraging at the moment. Chrysler, De Soto and Dodge divisions of the Chrysler Corp. are down for an indefinite period. Willys-Overland and K-F are out of production. Brief layoffs for 12,000 Hudson workers have been announced. Nash has scheduled a shutdown later this month of its car production program. A smaller reduction in appliance schedules will affect 1000 workers in Nash's Grand Rapids division and 250 Detroit employees. All Kelvinator divisions will operate on curtailed schedules at least until early December.

Several GM divisions have cut their work week to 4 days, including Chevrolet. This week Pontiac announced it will shut down its plants for an indefinite period on Nov. 23. Pontiac has already shifted its production to 1950 models.

According to Harry J. Klinger, general manager, Pontiac will have practically exhausted its steel supply before the end of the month. Asked how long he thought the plant would be down, Mr. Klinger said he couldn't make a prediction but felt that filling up the pipelines again will probably "take longer than most people think."

Incidentally, at his press conference this week Mr. Klinger made it clear that the Pontiac closing was in no way connected with the company's sales picture. Dealers' field stocks, including factory float, cars in transit, and cars retained for company use total 15,000 it was disclosed. About half of these cars are available for sale on the dealer's floor.

Few Pontiac's Available

When the total is divided among Pontiac's 4000 dealers the number of cars immediately available for delivery to the customer comes to less than two per dealer. To put it another way, cars available for sale by Pontiac dealers constitute a little more than a week's production. Total cars in the field, including dealers' stocks, factory float, cars in transit and demonstrators is a little more than 2 weeks production, according to Whit Ward, Pontiac's general sales manager.

Pontiac has high hopes for 1950,

PIPE TAPS *Every* TYPE AND SIZE

STRAIGHT AND TAPER THREADS

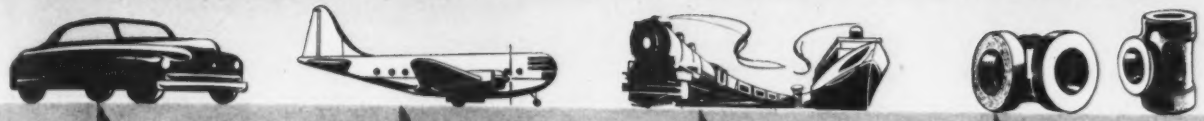
NPS . . . NPSF . . . NPT . . . ANPT . . . NPTF

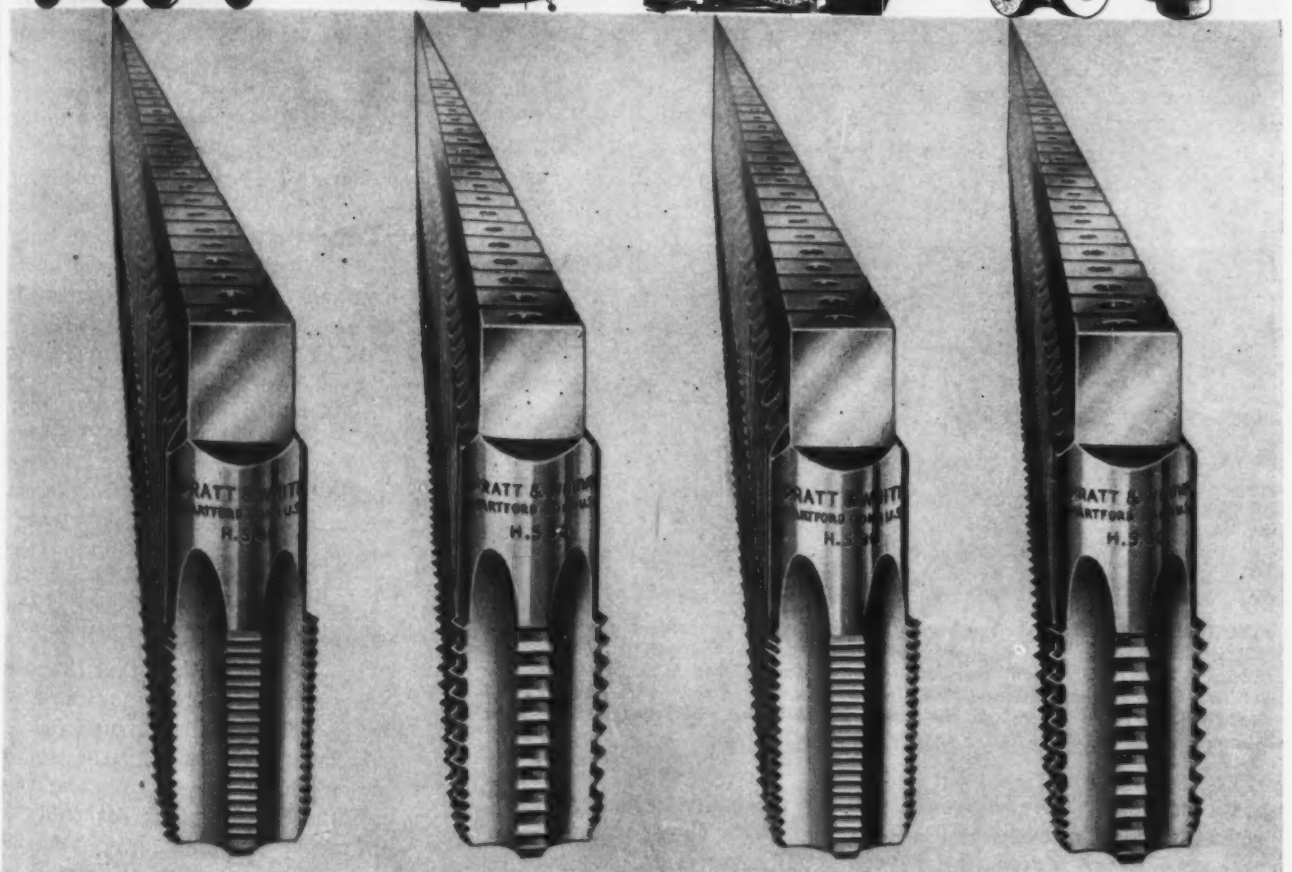
For Threading **AUTOMOTIVE** Pipe Fittings

For Threading **AIRCRAFT** Pipe Fittings

For Threading **RR & MARINE** Pipe Fittings

For Threading **PIPE FITTINGS** of All Kinds





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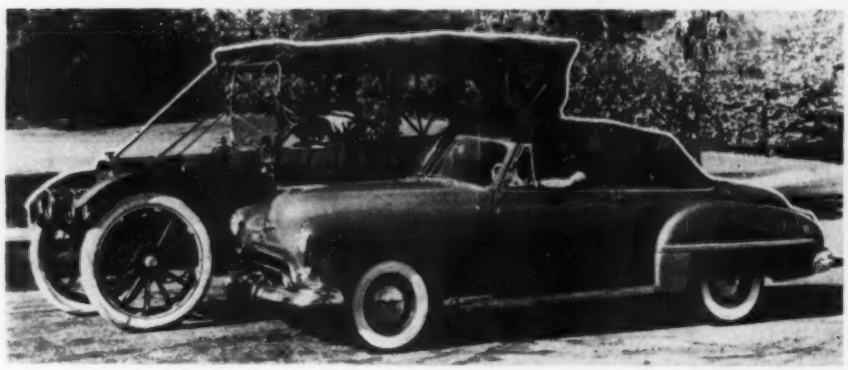
barring economic or political catastrophes not now foreseen. Its production schedules for the first quarter call for the highest production schedules in the company's history — about 35,000 cars per month. The enlarged capacity of the Pontiac plant is now 500,000 cars per year, it was disclosed.

At this week's meeting, Mr. Klinger made it clear that once material is again available in the necessary quantities it will go into production immediately. The old theories that castings must be aged before they go into a car is now just "an old fashioned theory," he said.

In private conversations with Pontiac officials it was disclosed that a difficult problem confronting production men recently has been the necessity for segregating flat-rolled steel subject to aging from non-aging steel grades. The company has had to plan its material schedules very carefully in order to minimize production problems asciated with the aging of flat-rolled steel, it was disclosed.



YESTERDAY AND TODAY: The beauty and compactness of the new "power package" is strikingly evident in this photograph comparing two Oldsmobiles built 39 years apart. The 1910 "Limited" four-door touring sedan weighed 5000 lbs, and sold for $5000, f.o.b. Lansing. The new 1949 "Futuramic" series 88 convertible weighs 3845 lb and sells for $2586 in Lansing. The early Oldsmobile had a 60 hp engine; the new 88 is powered by a 135 hp Rocket engine.

Predicts the End of Scuffed And Dirty White Sidewall Tires

The end of scuffed and dirty white sidewall tires is predicted by U. S. Rubber Co. officials who have recently introduced a new tire with a special "curb guard" that not only holds the whitewall away from the curb but actually pushes the whitewall section back into the tire to prevent direct contact with the curb.

Another feature of the new U. S. tire is a new tread that is reported to give performance on snow equivalent to the gripping action when chains are used.

In addition to deep, wide ribs to brace against side skids and keep the car running in line, the new tires have a series of fine, shallow cuts running in the direction of travel. The cuts are so narrow they appear to have been made by a sharp razor blade. According to U. S. tire experts, these cuts provide many flexible tread edges that are able to bite down to dry surface under rainy conditions, providing an unusually good grip on the highway. They are said to be equally successful in gripping in snow.

The new Mid-Century Royal Master tires carry three thicknesses of tread. As the shallow top tread wears down, tire dealers recut the tread to a proper depth. The recutting can be repeated twice, thereby giving the equivalent of 60 pct more mileage, according to Dr. W. A. Bull, director of tire development.

The tires are premium priced but the extra mileage and extra safety more than justify the price increase, according to U. S. Rubber officials who showed the new tires to the press here recently.

Tests Show Air Drag On U.S. Cars; Streamlining Discussed

Streamlining has been a much debated question in Detroit. While some auto experts are inclined to dismiss streamlining as relatively insignificant at driving speeds under 40 mph, most observers admit streamlining is very important at high driving speeds.

To determine the actual amount of air drag on a car and, more particularly, the efficiency of its new Airflyte models, Nash has recently run a series of tests in the modern wind tunnel at the University of Wichita, Kan. Tests were conducted by independent engineers on ten modern U. S. cars. As a result of these tests, the conclusion was reached that at a speed of 40 mph, the average car requires 6.8 hp to overcome air drag. At 60 mph, the hp used to overcome air drag is 22.8. This is increased to 54.1 at 80 mph on the average car.

Air Drag Varies Between Cars

The variation between cars is considerable. Among nine different makes tested, at 40 mph, the range was 5.6 to 8.1. At 60 mph the spread extended from 18.9 to 27.4 hp. At 80 mph, the range was from 44.8 to 64.9 hp.

Test results showed that the new Nash Airflyte design requires 20.7 pct less hp than its competition to overcome air drag in the speed range from 40 to 80 mph. At 40 mph the Nash Airflyte required 5.4 hp to overcome air drag. At 60 mph the hp requirement jumped to 18.1. The requirement for 80 mph was 42.9 hp.

Test engineers also pointed out some car design features that apparently add appreciably to the aerodynamic characteristics of a car. Here are some features that help to reduce air drag: A clean, rounded nose; enclosed fenders particularly at the front; curved, undivided windshield; smooth flowing rear contours, tapered both from the sides and the top; rounded curves of the fender underskirts; clean underside design free from air-catching frame cross members.

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WEST COAST PROGRESS REPORT

High quality scrap is essential to West Coast's efficient steel production . . . Western steel industry increases in importance.

Digest of Far West Industrial Activity

by J. J. Reinhardt

San Francisco—Whether by design or coincidence — who is to know—the Institute of Scrap Iron & Steel representing the Pacific Coast Chapters and American Iron & Steel Institute held their regional meetings last week in San Francisco. To an unbiased observer it was readily apparent that both groups were primarily interested in maintaining something like a very unacademic viewpoint on the production of steel in the United States.

L. S. Dahl, vice-president in charge of operations, Columbia Steel Co. of California, told the assembled dealers in scrap iron and steel that the maintenance of high quality scrap was essential to the maintenance of a high efficiency steel production in the West.

Stresses Scrap's Importance

Mr. Dahl is a newcomer to the western steel picture but apparently has quickly grasped the significance of the differentiation between practices prevailing here and in the East. Without embarrassment and with directness appreciated by both dealers and steel producers Mr. Dahl told the assembled dealers that here in the West where scrap charges were of extreme importance percentage wise and volume wise, that there was no consideration to be given to charges containing tramp material and that it was up to the dealers and to the brokers to assure their buyers that materials were as specified.

Marshall Shapiro, one of the principal scrap dealers on the West Coast and an officer in the institute, introduced Mr. Dahl with the expression that "here is a man who knows whereof he speaks."

Steel producers on the West Coast have been very fortunate in many respects in that there has been a close harmony of thought and integrity between both the dealers and the buyers insofar as the quality of materials was concerned. To a relatively unbiased and relatively well informed observer, scrap dealers and buyers on the West Coast have maintained a degree of integrity of relationship unequalley elsewhere in the United States.

Quality Scrap Submitted

Whether by coincidence, opportunity or sincere desire, scrap has been submitted in a clean definable fashion by the dealers with a minimum of rubbish content and an absence of other foreign materials. It is true that there have been a few scrap dealers on the West Coast justifiably charged with misrepresentation of materials submitted, but on a national basis it is the consensus that they have been in the minority.

Here in the West where scrap iron and steel constitute such a large portion of openhearth charges which have a cumulative effect, purity of scrap material is important. There is little opportunity to mask the impurity of scrap charges on the coast since they constitute such a large percentage of these charges.

Results of impure charges are cumulative and economically dangerous to the production of metal on the coast.

Scrap Demand Increases

The scrap dealers attending the Pacific Coast meeting of the institute individually, without identification, expressed the feeling that no longer could the Pacific Coast be looked upon as a scrap rich area. This is a natural expression of those who have merchandise to

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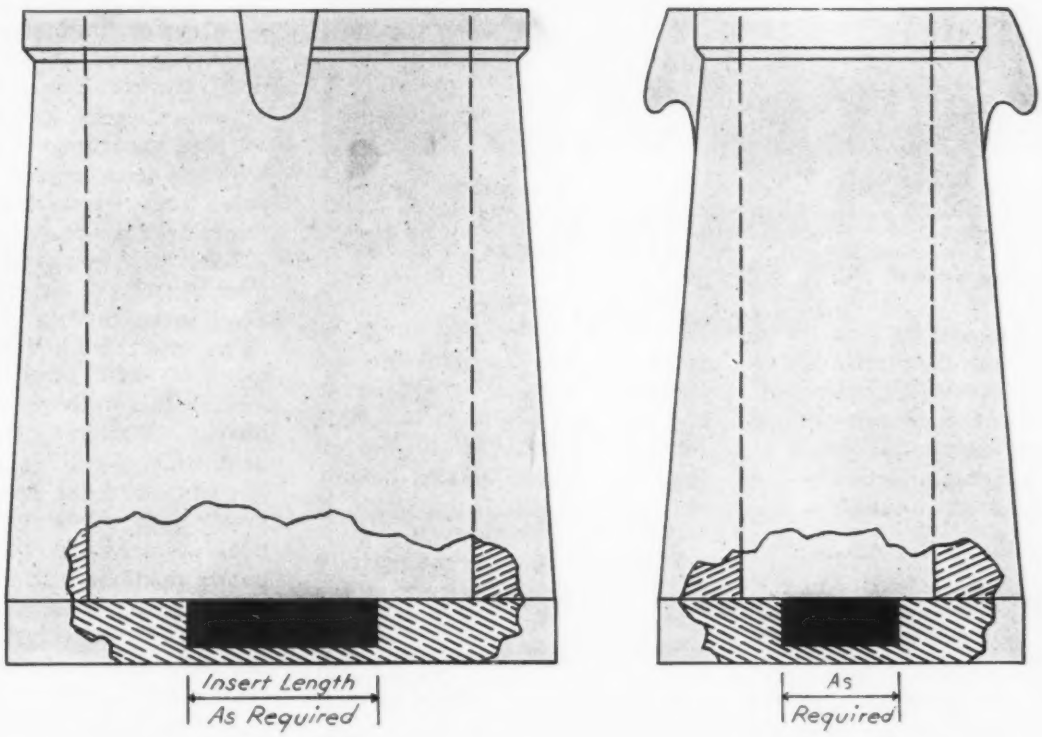
...when you use "NATIONAL" graphite stool inserts!



Use "National" graphite stool inserts in your open-bottom molds and you *eliminate stickers completely and forever!* Other advantages of graphite stool inserts are:

- They increase stool life by a wide margin
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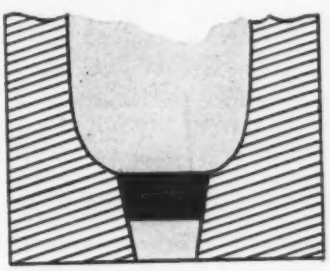

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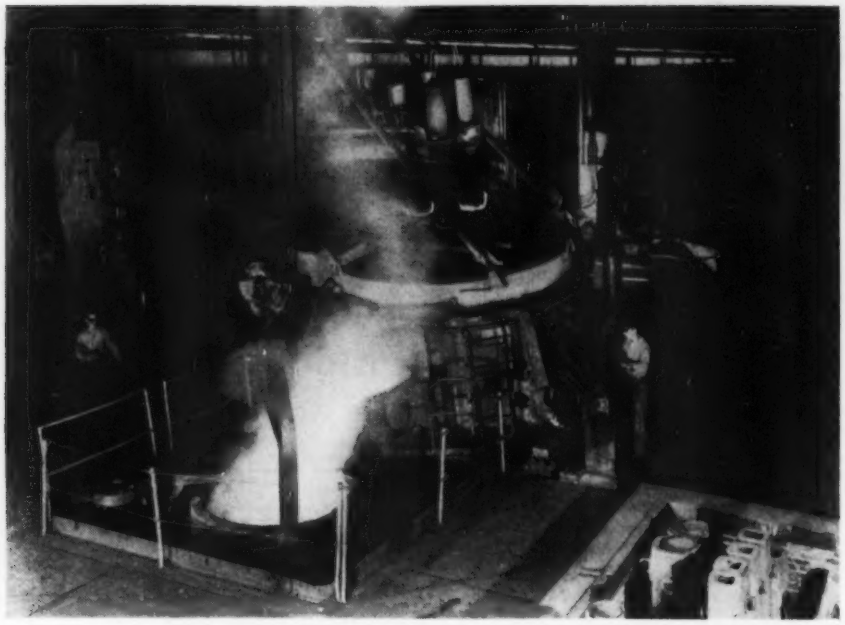

STEEL FOR THE OIL INDUSTRY: An electric furnace tilts and pours a heat of steel at the Torrance, Calif. plant of The National Supply Co. This steel will be used for "Kelly" production. The Kelly is the metal link that picks up the driving power of an oil rig's engines and transmits it, rotary-wise, to the string of drill pipe that is working down into the earth.

sell and demonstrates a desire to create a market of scarcity. However, there is some justification for substantiation of this feeling since shipbreaking and importation of scrap has practically become nonexistent in the West.

Must Rely on Dealer Scrap

Increased ingot capacity in the West, even in the light of the second blast furnace brought in by the Kaiser Steel Corp., is entirely likely to bring about a demand for scrap material never before known on the West Coast. These dealers who have invested from $250,000 to a million dollars in a scrap yard and in preparation equipment are scarcely unlikely to under estimate the potential of the area. Principal scrap buyers such as Columbia Steel Co., Bethlehem Pacific Coast Steel Corp., Geneva Steel Co. and Kaiser Steel Corp. are now affording substantial competition for the available material. Kaiser with its two blast furnaces at Fontana is in an enviable position to control both quality and quantity of purchases, although it admittedly is a considerable factor in the scrap purchases of the West.

Geneva Steel Co. has maintained an attitude of aloofness and independence since its plant was designed to function on home-scrap and pig generated in its own blast furnaces. Nonetheless, it is known that this plant is relying heavily upon its supplier, Luria Bros. & Co., for scrap supplies.

Following close on the heels of the Pacific Coast meeting at the Institute of Scrap Iron & Steel, members of the American Iron & Steel Institute held its 6th regional meeting in San Francisco last week which was attended by members of the daily press as well as the technical press in contrast with previous years experience.

R. F. Coulter, combustion engineer, Bethlehem Pacific Coast Steel Corp., reported on the "advances in combustion control" and extensively described the full automatic control of setup and use in the ten furnaces on the coast. In a technical discussion Mr. Coulter pointed out that there is probably no automatic control device on an openhearth furnace more important than the draft or furnace pressure control. A detailed review of practice in the West in this connection was given by Mr. Coulter who reported that the total number of primary furnaces increased capacity 297 pct in the past decade.

Steel Capacity Rises

Western steel industry is now producing 5.5 pct of the national steel output in a region once considered incapable of absorbing any sizable quantity of these products according to J. H. Shank, metallurgical engineer of the Colorado Fuel & Iron Corp.

It was shown that the West has long been the nation's source of mineral wealth and only lately have these reserves of iron ore been explored and their development initiated. Shipments of iron ore from Utah, California and Wyoming, were over 4 million tons in 1948 according to Mr. Shank with the iron content of some of these ores surpassing the Lake Superior average.

This fifth in the series of six meetings of the American Iron & Steel Institute was well attended by an interested audience of both technical and sales department men in this outpost of steel production. Walter S. Tower, president of the AISI discussed the importance of the San Francisco area to the national steel industrial picture, and D. R. James, public relations man for the AISI exerted commendable influence on interpreting this information to the daily and trade press of the West which, until recently, had been either apathetic or hostile to the industry.

GE Retooling Motor Plant

San Jose, Calif.—General Electric Co. has spent approximately $400,000 in retooling in its 144,000 sq ft factory here which is now producing a streamlined general purpose electric motor which is about 20 pct lighter in weight and size than previous models of the same capacity, it is reported. The new unit which is expected to be widely used for air compressors, commercial refrigeration, air-conditioning and other equipment is available in two types with ratings of from ½ to 5 hp, according to Carl J. Anderson, plant manager.

Guess which twin has the
Reeves-equipped machine!

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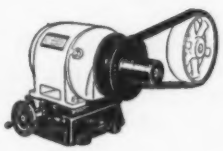

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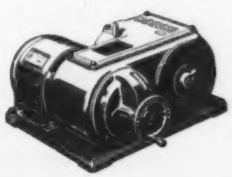

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THE FEDERAL VIEW

THIS WEEK IN WASHINGTON

New England's search for a steel mill to be given a boost . . . Congressional fight expected on defense plant locations . . . ILO reports on the world steel industry.

by Eugene J. Hardy

Washington—The efforts of the New England states to locate a steel mill in this six-state area are certain to get a boost from the Democratic party at the New England Democratic Conference scheduled for Boston, Nov. 20-21. Officials of the Democratic National Committee who have been working on the agenda for this meeting told THE IRON AGE that New England's search for a steel mill will be considered during at least two of the panel discussions.

The first of these will go into the power problems of the New England states, particularly the effect of existing rates on both light and heavy industry and the need for new sources of electric power. The steel mill proposal will be considered in the light of power requirements and as an outlet for possible new sources of power.

Will Discuss Steel Mill

Another discussion, entitled "Partners for Prosperity," in which farmers, labor and business will be heard, will also discuss the steel mill proposal as a factor in rejuvenating the economy of the New England area.

The Quebec-Labrador ore development will be highlighted as another argument in favor of a steel mill in this area. The Democratic party will also reiterate its long-standing support of the St. Lawrence Seaway.

Federal Aid to Be Offered

This conference, one of a series designed to strengthen the Democratic party's hold on the national administration, will have its purely political aspects, but the opportunity to offer federal assistance to an area which needs rebuilding in the industrial sphere will not be lost. One of the earlier conferences, held at Des Moines, was designed to strengthen the farm-labor alliance which brought about the election of President Truman last year. The other, at San Francisco, emphasized resources development and basic industrial problems encountered in the fast-growing Western States.

The New England area, where American industrialism had its beginning, offers a fertile field for the party in power. Having lost a considerable number of manufacturing plants to other states, any programs involving federal aid and encouragement will be seized upon.

The Democratic party will offer something to New England. It has no other choice. Federal aid in obtaining cheaper power is likely to be in the No. 1 spot. Further assistance in obtaining industries to utilize this power is the next logical step and a steel mill has long been in the minds of New Englanders. Such aid might take the form of promises of federal funds, through the Reconstruction Finance Corporation, legislation calling for federal power development, and, perhaps, tax incentives to encourage industry to locate in this area.

Congressional Fight Looms On Defense Plant Locations

A lively fight over whether or not defense plants should move inland for security reasons is due to break out in Congress early next year.

A group of congressmen from coastal areas headed by Senator Magnuson, D., Wash., and Delegate Bartlett, D., Alaska, is organizing a campaign to build up defenses in

Does your cutting oil give results like these?

$351.60 saved in coolant alone—in 40 days . . . and better machining!

This farm implement parts manufacturer formerly used a straight cutting oil in an automatic (49c per gal.) and a regular lubricating oil in the reservoir.

Now he uses ANTISEP ALL-PURPOSE BASE, (1-15 with water), both as a coolant *and* lubricant. No rusting or bearing wear, no skin trouble, no parts too hot to handle.

And real money saved—$351.60 in 40 days on one machine, plus the saving in lubricating oil. Nine months' run has proved the practical value of this change.

Production upped 15% . . . and tool life increased 50%!

The above threaded screws are brighter; tool life has increased 50% on chasers, 100% on forming tools; speeds increased to enable 15% greater production.

That's the experience of a clamp manufacturer using ANTISEP A. P. BASE, 1 to 25 water dilution.

And that can be your experience when you try this new concept in cutting coolants, which can handle 90% of your machining operations. May we prove it? Write E. F. Houghton & Co., Philadelphia 33, Pa.

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CUTTING BASE

Alaska as well as to block the transfer of plants from the East and West Coasts and the Great Lakes area to the interior.

Plant Removals Considered

This Senate-House group, alarmed by plant removals as well as the location of new plants in areas like Tennessee and Arizona, is drafting legislation designed to force the military to build up, rather than weaken, coastal defenses.

This new group, which has unofficially termed itself the "National Defense Committee," says there is "alarming evidence" that the armed forces do not consider the coastal areas well defended and are making efforts to move industries from these areas to inland locations.

Defense Program Proposed

The implication of these actions is that coastal areas and the Great Lakes region, because they are considered within bombing range of potential enemies, are not defendable and must therefore be considered vulnerable, the committee states.

A three-point program to maintain defenses in the coastal areas is now being drawn up by the affected congressmen. Here is what they propose:

(1) To pass legislation early next year instructing the Army, Navy, and Air Force to fortify and develop Alaska as the key to Pacific Coast defenses, and to prepare the Great Lakes and Atlantic coast areas against attack "so that no part of the U. S. will rest under the stigma of vulnerability."

(2) To get assurance from the Defense Dept. that aircraft and other plants will receive future contracts on the basis of quality, cost and time competition.

(3) To "educate" communities in coastal areas on the need for adequate defense and the danger of depleting existing defenses—including manufacturing plants—by their removal to isolated areas in the interior.

The new committee says the armed forces have given "tacit admission" that they consider certain coastal areas "indefensible." To prove it, they point out that the Navy has asked Gruman Aircraft Engineering Corp. to move from Bethpage, N. Y., to Phoenix, Ariz.; the Air Force has asked Chase Aircraft Co., to move from Trenton, N. J., to Marietta, Ga., and that other firms, including Consolidated Vultee Aircraft and Chance Vought, have found it easier to get contracts for their Texas plants than for their plants located on the Atlantic and Pacific Coasts.

THE BULL OF THE WOODS — By J. R. Williams

WHAT DO YOU WANT US TO DO, FINISH IT DOWN TO A THOUSANDTH OF A INCH? I THOUGHT YOU HAD MACHINES FER THAT!
I KNOW, BUT IF YOU CAN'T WORK CLOSER THAN A FOOT, YOU GET TH' CREDIT FOR BEIN' FAST AND US FOR BEIN' SLOW!
THERE GOES THE OLD DEPARTMENT DUCK AND DODGE -- YOU DO YOUR WORK SO WE WON'T HAVE ANY! IT'S A BEAUTIFUL DREAM--EVERYBODY LIKES IT!
THE DIPLOMATS
11-18 J.R.WILLIAMS
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ILO Studies Reveal Basic Issues Facing the Steel Industry

The iron and steel industry throughout the world must rely increasingly in the future "on what might be termed the normal demand for steel, with little further support from the arrears of unsatisfied demand which accumulated during the war and immediate postwar years."

High prices for steel seem "almost certain to coxstitute a greater deterrent to the purchase of steel in the future than has been the case in the recent past."

"There is not much to be hoped for from policies aimed at regularizing steel purchasing."

A "very considerable and widespread increase in output per manhr in the industry may be confidently anticipated."

Unemployment May Appear

There has been little, if any, technological unemployment since 1939, but with supply catching up with demand throughout the world, it may soon begin to appear.

If employment in the steel industry is to be maintained, there must be a considerable increase in demand.

These are among the principal conclusions in the various reports prepared by the International Labor Office in Geneva for consideration by the ILO Committee on Iron and Steel, which opens another of its meetings on Nov. 22. Many of the subjects were considered by the committee at its meeting in Stockholm in 1947. Each of the 16 countries will send delegations composed of two representatives each from government, labor and industry.

IRON AGE
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FEATURE ARTICLES

How Oldsmobile Uses

Induction Heat for Forging

By WILLARD L. MAUTZ

Supervisor of Production Engineering,
Oldsmobile Forge Plant,
Lansing, Mich.

SUMMARY: The use of induction heating as a method of heating forging stock at Oldsmobile is being increased because experience to date has indicated better forging die life, savings in raw material, lack of scale, ease of stock handling, and cleanliness are afforded by this method. The author describes the equipment used, its layout, and gives production data for typical forgings.

FOLLOWING wartime installations of induction heating equipment used for stock heating in the forging of 75 mm and 105 mm shells, the forge plant of Oldsmobile, with increased facilities, will turn out in 1949 nearly 30,000,000 lb of automotive parts, forged from stock heated by induction. Of the 225 lb of forgings that go into each of the new Oldsmobiles, 33 pct will be made from stock heated by this method. Connecting rods, for example, were formerly made in multiple strike hammer forges, but now are turned out at high production rates and extremely close dimensional and weight tolerances on forging presses. The ability to hold to such close tolerances is made possible by the scale-free heating characteristics of induction heating.

The Oldsmobile forge plant operates more than 50 induction heaters, powered by 11 motor-generators. The generators operate at a frequency of 2000 cycles and have a total capacity of 5400 kw. Figs. 1 and 2 show the basic setups for this equipment.

Five generators, as shown in fig. 1, are each rated at 600 kw and are housed in a clean, well ventilated room. These units are adapted for parallel operation and feed current at 400 v into a common bus that is run in floor trenches to the heater locations. Power control is automatic, relieving the operators of this detail.

The bus from the paralleled 600 kw generators is tapped at six locations. At five of the locations the power is used in banks of four

Ajax-Northrup heaters operating in parallel, but being fed and delivering heated bars sequentially at 12 sec intervals. The heaters are adapted to draw about 125 kw each when heating a cold bar, but this power drops off during the heating cycle. Since some of the bars are always cold and some are always hot, the average power per heater is about 112 kw, or 450 kw for the bank of four heaters. Heating time for a 1½ in. round-cornered square bar, 12¾ in. long, is 48 sec. This particular bar size is used in making connecting rods, are shown in fig. 3.

The entire heating cycle is automatic. The bars are manually placed into the loading chutes, but from there they feed in timed sequence into and out of the heater stations. If the press operator is not ready to receive the hot bar as it emerges from the heater, driven rolls remove it completely from the heater and deposit it onto a moving chain belt that carries it to the press location. Each bank of four heaters can deliver 300 bars an hr, and since two connecting rods are pressed from each bar the production capacity is some 600 rods per hr. Actually this rate overheats the dies; therefore the furnaces are not operated to full capacity.

The balance of the power from the paralleled 600 kw generators, about 750 kw, is fed into a single long heater coil adapted to heat slugs in a continuous run from cold to forging temperatures.

The principal advantages derived from paralleling the motor generator sets are flexibility and efficiency. The presses may be adapted to speed up or slow down production by varying power consumption. When some of the presses are closed down, some of the generators likewise may be cut off. The load factor of the generators as a whole thus may be kept up, insuring maximum efficiency of the machine in use with reserve power when required.

There are six 400 kw, 2000 cycle generators elsewhere in the shop, feeding individual upsetting machines on which are made Hydramatic

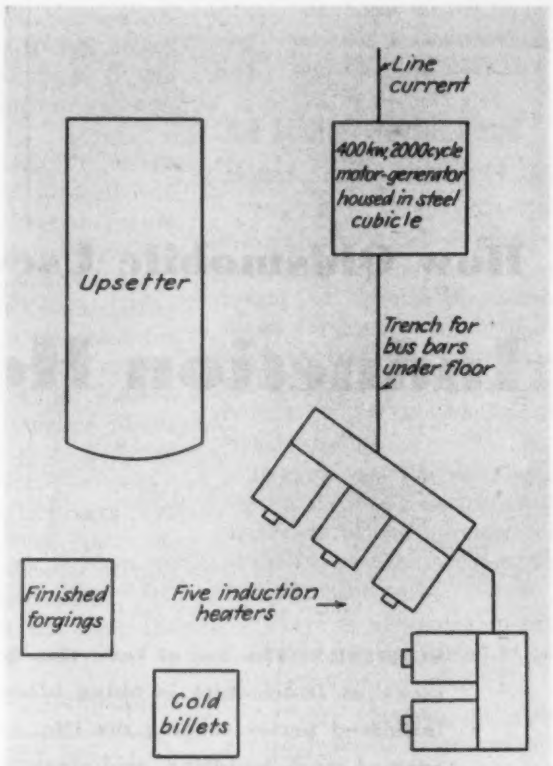


FIG. 2—Six 400 kw induction heating units at Olds forge plant are arranged as shown here. Each of the 2000 cycle motor generator sets is housed in a steel cubicle and operates five heating coils feeding billets up to 1¾ in. diam to upsetters.

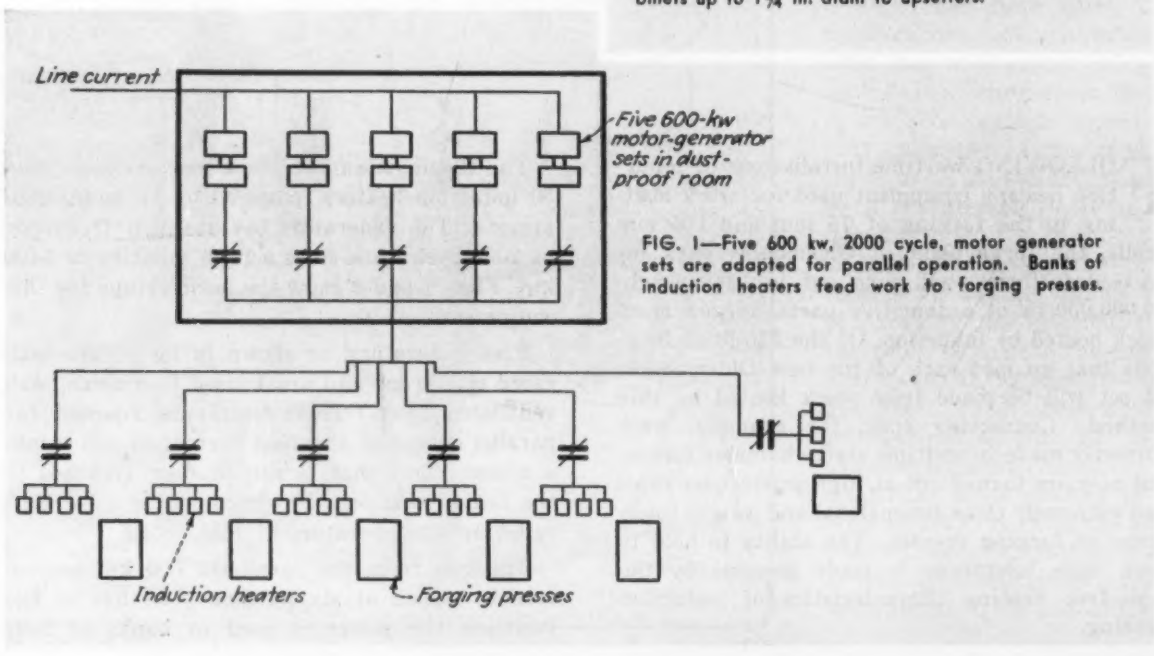


FIG. 1—Five 600 kw, 2000 cycle, motor generator sets are adapted for parallel operation. Banks of induction heaters feed work to forging presses.

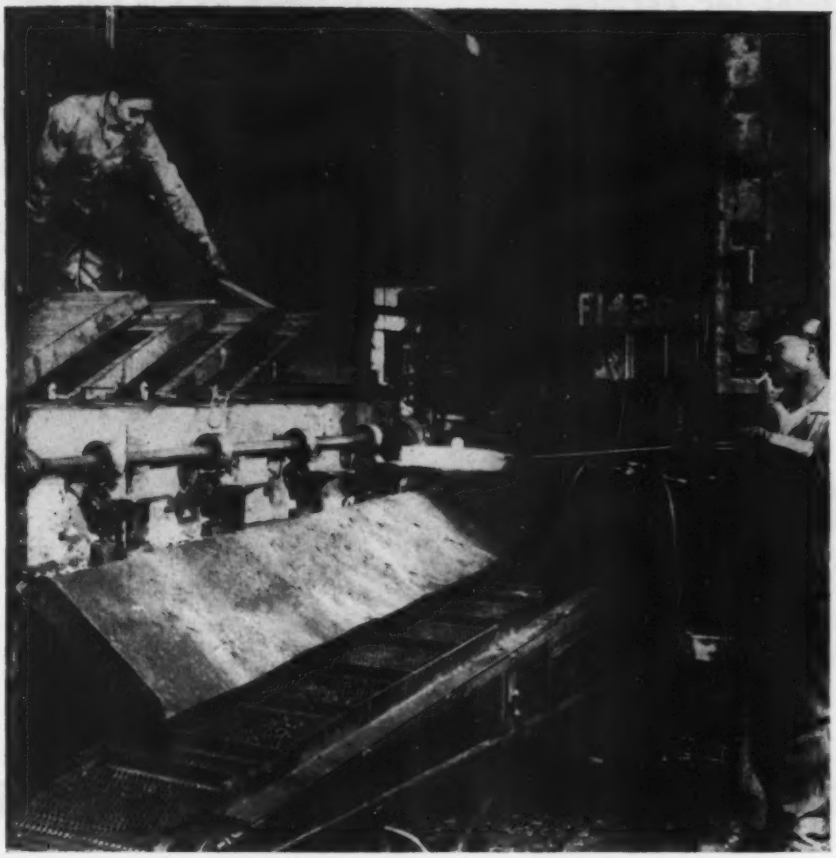


FIG. 3—White hot billets emerge from the bank of induction heaters at rates up to 300 per hr, ready for forging. Cold billets are fed into the heaters from chutes and heating time is automatic.

drive shafts, pinions and a variety of other parts. This type of arrangement is shown in fig. 2. Each generator is individually housed in a steel cubicle beside the upsetting machine and feeds a bank of five heaters operating in parallel. These units have the flexibility of individual voltage control not available in the paralleled 600 kw units, but are slightly less flexible in overall loading. Plans are being made for eventually housing these generators in a central location, and for feeding the respective heater banks from a common bus. By combining the reserve capacity of each of the six generators, sufficient power may be found to add more heating stations.

As is customary with equipment of this type, capacitors are located close to the heater coils that they compensate. A cubicle, provided at each station, houses the capacitors, necessary switches, timers and automatic control equipment.

The heater coils themselves permit flexibility of heater operation. Not only are they easily replaced in event of trouble or change of schedule, but they are adaptable to heating bars of various dimensions if the range is not too great. A heater adapted for 1¾ in. diam bars, for instance, will easily accommodate a 1½ in. piece. On the smaller diameter pieces there is some loss of efficiency because of poorer electrical coupling between inductor and workpiece, but the gain in setup time usually outweighs this.

In these same heaters 1 3/32 in. diam bars are fed into the heaters three at a time, pyramid fashion, to give more bulk to the charge and improve the coupling and the efficiency. The only setup time when switching from one job to another is for resetting the timer control and changing the heater taps to accommodate the length and heating requirements of the new piece.

The induction heaters take little space at the forging machine as compared with other types, and this space saving is important. The heaters are placed so as to require a minimum of operator exertion in feeding bars through them for the forging operation.

Typical of the parts forged from induction heated bars are those shown in fig. 4. Stock for connecting rods is double length, with two rods formed from each heater bar. Four sizes of pinions are upset from 1½ in. diam bars heated for lengths of 12¼ to 14 in., depending upon the pinion size. The stock for transmission main shafts is pyramid loaded into a 1¾ in. heater, three bars at a time. Other details on the heating and forging of these parts are shown in fig. 4.

Induction Heat for Forging

Continued

One of the primary advantages of induction heating at the Oldsmobile forge plant is the saving of steel. With longer heating cycles of fuel fired furnaces, as much as 3/64 in. of the surface of a steel bar may peel off as scale. With induction heating, the bar is heated to the forging temperature so quickly that there is little time for scale formation.

In heating the ring gear blanks, it was possible to reduce the stock weight from 17.33 lb to 14.96 lb, a saving of nearly 14 pct over the weight required with the pusher-type fuel fired furnace. Figured on a yearly basis of 50 weeks of five 8-hr days with steel at 4¢ a lb and power at 1¢ a kw-hr, this saving amounts to some $65,000.

Along with the saving of steel, the fact that there is less scaling with induction heat means better die life and fewer forging rejects caused by scale pitted surfaces. The scale free condition of the induction heated billets, coupled with

(a) Connecting Rods:
Production, 400 per hr
Tolerance, 2 oz per rod
Stock, 1½ in. round-cornered squares, 12¾ in. long
Equipment, one bank of four heaters with capacity of 300 bars (600 rods) at 450 kw

(b) Pinion Blanks:
Production, 300 per hr, 4 different sizes
Stock, 1½ in. diam bars, 12¼ to 14 in. long
Equipment, one bank of five heaters at 400 kw

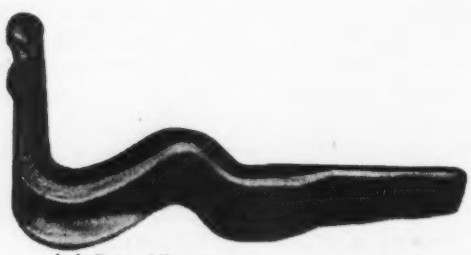
(c) Transmission Main Shafts:
Production, 190 per hr
Stock, 1 3/32 in. diam bars 12 in. long
Equipment, one bank of five heaters at 400 kw — three lengths pyramid loaded in 1¾ in. heater

(d) Transmission Output Shaft:
Production, 310 per hr
Stock, 1¾ in. diam bars, 13 in. long
Equipment, bank of five heaters at 400 kw

(e) Transmission Gears:
Production, 235 per hr
Stock, 1¾ in. diam bars, 13 in. long
Equipment, one bank of five heaters at 400 kw

FIG. 4—Typical parts forged from induction heated bars are shown here. Production, material, and heating equipment data are shown for each part.

(f) Ring Gears:
Production, 317 per hr
Stock, 4 in. slugs, 3 11/32 in. long
Equipment, 14 ft continuous heater at 850 kw from paralleled 600 kw generators



(g) Door Hinges:
Production, 225 per hr
Stock, 1 5/16 in. diam bars, 12¼ in. long
Equipment, bank of four heaters at 425 kw from paralleled 600 kw generators

the positive control over temperature, permitted Olds to pioneer the development of the high speed, press-forging of connecting rods. Previously it required eight to ten drops of a hammer, with slow flow of metal to give the accuracy desired in the piece. Now these same connecting rods are forged two at a time in three passes of the press.

Induction furnaces do not require start up time. They turn out hot billets a few seconds after the button is pushed at the start of the shift. At lunch time and for emergency stops, the heaters are turned off. The furnaces do not have to be unloaded to protect the billets from overheating, although some of the previously heated bars usually are removed before a new heating cycle is begun. No stock is burned up or melted. During emergency shutdowns the crew can be assigned immediately to a standby machine with almost negligible loss of production while the defective machine is being serviced.

Working conditions are improved. All heat is induced directly in the billets to be forged so the only lost heat is that resulting from radiation from the billets. The furnaces are cold. There are no gas or oil flames, and no fumes except those from oil on the billets or lubrication on the dies. The need for ventilation is materially reduced and cooling fans, which formerly were required the year round, now are used only during the summer months. The roar and noise of the fuel fired furnaces has been replaced by the silent electric heaters.

Handling of the billets is easier. Because of the fast heating cycle, many pieces that are heated only on the end can be handled with gloved hands where previously tongs were required. Fuel storage problems, feed lines, waste gases and danger of explosion are nonexistent.

Some of the high frequency generators now being used in the Oldsmobile forge plant were installed during the war for the production of shells and have been in operation for nearly eight years with no more than preventative maintenance. Furnace coils have been in service for periods from two to eight years. The older ones are the same used during the war and the newer ones are those installed as part of the Olds reconversion and modernization program. Outside of a few minor refractory failures caused by the melting of bars unwittingly started from hot after a short shutdown period, the furnaces have required little maintenance.

The induction furnaces have proved their worth at Olds. They are ideal for high volume, long run forging jobs, and are thought to offer the most successful method for heating bars where tough overall forging specifications are involved. At present Oldsmobile's 5400 kw of induction heating capacity is working nearly full time with enough cost data to justify its relatively high capital investment.

With appreciable savings in steel, closer control, better working conditions and other production economies, greater percentages of future production will be handled by induction heat.

Dynamic Strain-Gaging of Seamless Steel

STRAIN-GAGING equipment has been used at National Tube Co. to determine instantaneous loads on the plug and bar while seamless steel tubing was being rolled in the high-mill after piercing. In another instance, exact figures were obtained on strains and stresses occurring in a drill-pipe joint while the joint was being assembled, and later, while the joint was tested for bending. Similar data were obtained for a threaded bell joint casing while the joint was pulled in tension to destruction.

Two 6-channel electrical resistance strain-gage units, employing a 2000-cycle carrier wave and individual amplifiers and strain indicators, have been used. Preliminary results obtained with this equipment indicate that, among other things, correlated data may result in improved joints and coupling design.

Two recording galvanometer-type oscillographs capable of operation up to 500 cycles per sec are also in use. The oscillographs can determine temperature drops at rates up to 2800°F per sec, and record the readings from thermocouples attached to the specimen. This equipment is being used to study quenching rates for aid in development of a new method of spray quenching.

A standard static-reading indicator has been provided which indicates results from the SR-4 strain gages in terms of five millionths of an inch. A Fairchild oscillo-camera may be mounted on either of two standard oscillo-scopes, making them available for use as recording cathode-ray oscillographs. These are useful in determining peak strains under impact conditions, or in studying hydraulic surges. In the camera unit, film speed may be varied from 1 imp to 60 ips.

British Investigations of Modified Cupola Designs

SUMMARY: Investigation of the effect of modification of normal cupola design on refractory consumption, production rates and analysis control, is reported herein. Among the modifications covered are several types of stack silhouettes, water cooled linings, a well-less cupola, and a water cooled basic lined cupola. This is an extended abstract of an article originally published in the *Foundry Trade Journal*, London.

THE normal practice in the construction of a cupola is to maintain a parallel wall extending from the well to the charging door, or as an alternative, to flare-out the lining at a certain distance above the tuyeres. The object of boshing in the accepted sense does not necessarily appear to be associated with lining life, but more to give increased volume above the melting zone, and little consideration appears to have been given to melting zone dimensions and shape in relation to erosion.

In considering this question, it was decided to modify the construction of a cupola on the assumption that some inprovement in refractory consumption might be effected if, at the maximum temperature zone, the wall above the tuyeres could be set back.

Fig. 1(*a*) shows the first attempt in which the melting-zone section of the normal cylindrical stack of a 37-in. internal diam cupola was replaced by a truncated cone, 37 in. ID at the top where the cone joined the stack, and 56 in. max ID immediately above the single row of tuyeres. The height of the conical section was 48 in. and the structure was supported by a series of steel gussets distributed around the base of the cone. From observation of the appearance of the lining at the conclusion of a normal 9-hr melt, it appeared that the brickwork of the inclined wall was affected only by slight fusion at the joints. the corners of the bricks slightly rounded and slag attack negligible.

No repair was necessary on the cone face for five consecutive shifts when the maximum extent of the erosion was 3 in. As would be expected, erosion of the portion immediately above the tuyeres was appreciable, due to localized high temperatures, metal flow and slag attack. At the same time, however, by concentrating most of the erosion over a reduced area, a saving of 40 pct in repair material was shown.

The next step was to replace the brickwork im-

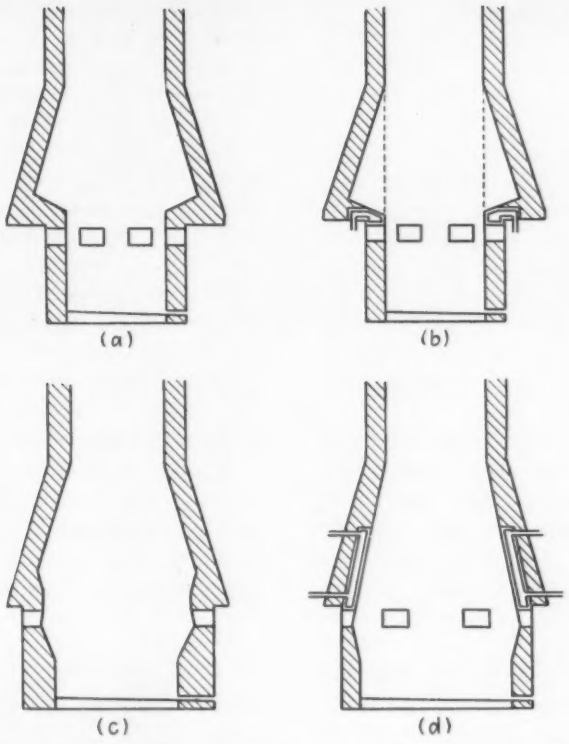


FIG. 1—Four stages in the development of a conical water cooled cupola.

By E. E. RENSHAW and S. J. SARGOOD Ford Motor Co., Ltd., Dagenham, England

mediately above the tuyeres by a system of six cooling segments, each segment or jacket being integral with an individual tuyere, as shown in fig. 1(*b*). Water was supplied to the jackets from a common main supply, each jacket having a separate feed and exit. The cupola was operated on production in this condition for some four months and the deduction was made that, while refractory consumption was reduced to very small proportions, at some stage in the melting there was the danger of an odd stream of metal falling on a water-cooler and causing local failure. Protecting the cooler face with a layer of refractory was found to be ineffective, as it was proved that this protective layer was removed in the early stages of a melt. With this cooling system, operating temperature was lowered and necessitated increasing the coke consumption by 10 to 15 pct.

It was felt from this experiment that water cooling, in some manner, would provide a solution to the melting-zone erosion problem, provided the thermal efficiency of the cupola was not lowered. However, work on a cooling system was temporarily suspended until a later stage, the next step being to increase the well diameter, thus eliminating the protruding ledge, as shown in fig. 1(*c*). As was expected, the erosion was transferred to the normal location on the inclined face immediately above the tuyeres but proved to be considerably less than with the vertical wall.

Over a period of six months' operation, a saving of 60 pct of patching material was shown, the inference being that, while the hot-face temperature remained the same as with parallel walls, by virtue of the angle of inclination, the adhesion of slag to the refractory surface was reduced and there was less tendency for slag and metal to flow down the wall face, which thus minimized the attack.

At this stage, it was decided to revert to water

cooling, using exposed plain-surface water jackets to replace the refractory on the inclined face to a height of 30 in. above the tuyeres [fig. 1(*d*)]. Although these coolers proved to be reliable, since no damage from metal-flow occurred, it was found that, to maintain normal tapping temperatures, only 50 pct of the total melting-zone area could be jacketed, because it was obviously undesirable to solve a refractory problem at the expense of thermal efficiency.

Covering the cooler face with refractory was again proved ineffective, the heat conduction through the refractory coating being insufficient to lower the hot-face temperature until the lining became comparatively thin, and even then, the remaining thin layer was completely eroded in a comparatively short time. Using plain-surface coolers, water cooling behind a refractory having a specific conductivity as low as ganister did not appear to be effective.

Corrugated Coolers

Consequently, as a major development, it was decided to install redesigned coolers with corrugations on the exposed face as described by Bamford[1] and which had proved satisfactory with a parallel wall. This type, shown in fig. 2, is made as a steel casting with the exception of the rear face which is a steel plate welded into position. The water-inlet pipe, ¾-in. diam, is extended to the base of the inside of the jacket to insure circulation and two outlets are utilized, one 2-in. diam, as a return to the system, and a second, also 2-in. diam, fitted with an open section to act as a safety opening for steam release.

The advantage of this type of cooler is that the corrugations may be filled with ganister, most of which remains *in situ* throughout the melt. In practice, a water throughput of 2500 gal per hr is sufficient for a cupola of the dimensions quoted, giving a rise in water temperature of 68°F from inlet to outlet.

In considering the thermal flow with a cooling system of this kind, embodying a relatively large cooling area in a most critical portion of the furnace, it would be expected that the thermal efficiency would be seriously impaired. In practice, the true indication is the average tapping temperature comparison for an equivalent coke percentage with and without water cooling; this difference has been found to be no greater than 68°F.

The relatively low heat loss is probably due to the insulating effect of the ganister remaining in the corrugations, and also to a layer of slag, approximately 3/16 in. thick, which is found to be deposited on the exposed surface and which remains throughout the melt. In the case of plain-surface coolers, traces of a similar layer were observed around the edges of the coolers after a melt, but it is obvious from the large area and small thickness that such a sheet of slag would be extremely fragile and unlikely to remain intact on these during melting.

The corresponding layer over the grooved coolers is reinforced each 2 or 3 in. by the ganister in the corrugations and is fused into the surface of this material. In addition to refractory saving, further advantages due to water cooling become self-evident, such as reduced labor repair charges, the possibility of operating multiple shifts or the use of a single cupola on consecutive days, thereby reducing installation costs.

Well-less Cupola

Having dealt with the refractory problem in the melting zone, attention was turned to the portion of the lining below this section. Work in this direction was not concerned initially with refractories, but more with cupola practice and

FIG. 2—Corrugated cast steel water cooling unit used in the melting zone of the conical cupola.

thermal efficiency, although the changes have resulted in a further saving of refractories in this portion of the furnace.

This method may be applied only to the continuous-tapping cupola fitted with a receiver. With most cupolas, pyrometric checking of initial tapping temperatures often reveals an appreciable lag in reaching peak operating temperatures. Certain recognized precautions may be taken with the object of preheating the furnace prior to blowing.

With the generally accepted depreciation in coke properties, bed heights are quoted as high as 60 to 80 in. above the tuyeres and such a depth

of coke is very undesirable for reasons of composition control. Increasing the bed height merely serves to raise the metal temperature at the melting zone and, unless the well lining temperature is initially high, very little increase in tapping temperature follows. The well, situated as it is below the combustion or melting zone, is not subjected to any direct heating, but derives its heat mainly from the molten slag and metal as they accumulate and pass through to the tapping hole. The heat transfer from the molten products to the refractory lining in the furnace well is appreciable, particularly in the early stages of the melt and until the temperature of the inner face approaches that of the slag and metal. Even in the later stages of the melt, when temperature equilibrium has been reached, some degree of heat loss is inevitable.

With the continuous-tapping cupola, it has been found possible virtually to eliminate the well, tapping the metal immediately on melting into the receiver. Figs. 3(*a*) and 3(*b*) show the modifications which have been made. The construction of that portion of the furnace below the tuyeres which normally constitutes the well has been modified to enable the well proper to be replaced by a narrow channel. The molten slag and metal, on passing the tuyeres, are diverted immediately into the channel and out of the tapping hole into the slag-separating device. The column of slag maintained in the channel is sufficient to prevent the blast from escaping through the tapping hole and so enables the continuous-tapping device to function in the usual manner. It will be seen that there is a considerable reduction in the surface area of refractory through which heat may be lost, the molten products being collected and conveyed from the furnace at their maximum temperatures.

Fig. 3 (*a*) is plan and (*b*) a sectional elevation and, as shown, the drop-bottom doors have been raised to a position 12 in. below the tuyeres, allowing for a sand depth of 6 to 8 in. and a box (which is fabricated from steel plate) to be fitted and secured in position by welding. This box is fitted with a door or flap, hinged at the base and flanged at the top, so that it is held in position by the drop-bottom door; on releasing the supporting prop, both doors and flap open and hang downwards.

The front wall of the auxiliary box containing the tapping hole is lined with refractory, the remainder of the channel being formed by molding sand rammed hard around a tapered former 6 in. wide. The bed of the furnace is arranged to slope towards the channel. The same purpose may be achieved, without the necessity for the structural alterations described, by raising the normal sand-bed depth to within 4 to 6 in. of the tuyeres, the channel being formed as above. Fig. 4 shows a perspective exterior view of the modified cupola.

This method gives excellent results on acid-

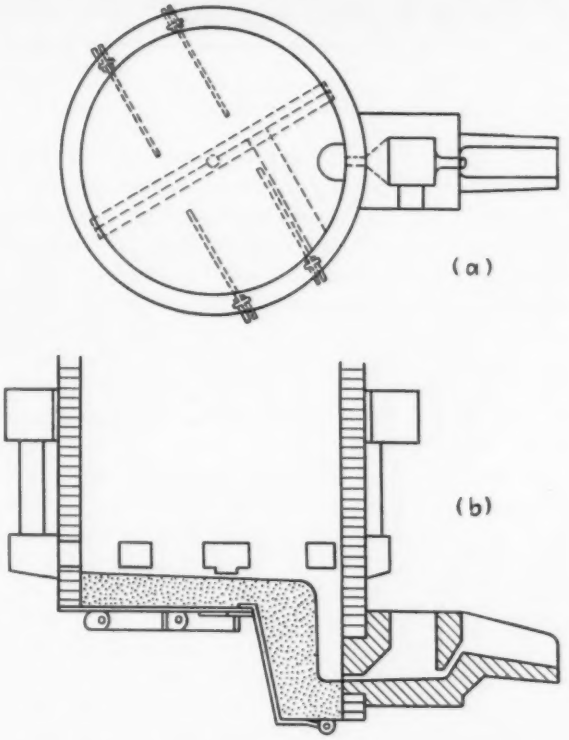


FIG. 3—Plan view (a) and sectional elevation (b) of the well-less cupola, without water cooling.

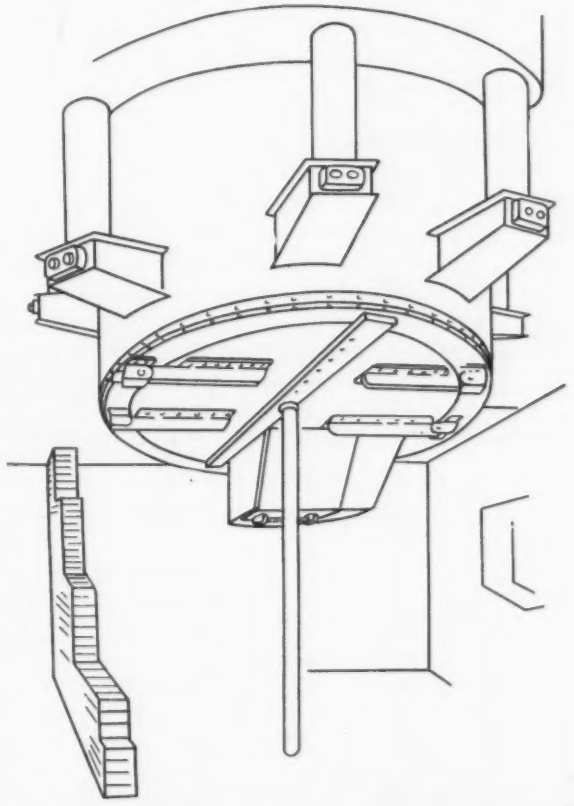


FIG. 4—Perspective view of the well-less cupola from below, showing construction of the drop bottom.

lined cupolas, so that previous precautions for preheating the cupola are now unnecessary and blowing may commence immediately the coke bed is ignited and charging completed. Normal coke-bed heights may be used, and it is possible to obtain satisfactory tapping temperatures with a bed 26 in. above the tuyeres. Low cokebed height is of considerable assistance in obtaining low initial sulfur pick up and carbon and silicon control of the first charges melted is more positive.

In addition to an improved initial tapping temperature, the average temperature of the metal throughout the duration of the blow is appreciably higher. The total area of exposed well refractory being low, a substantial economy of repair material ensues and by utilizing a proprietary carbonaceous ramming material for the preparation of the tapping hole, a considerable improvement in its life is obtained over that of the rammed siliceous refractory previously employed. Being inert to slag attack and unwetted by slag or iron, the carbonaceous preparation constitutes a most effective refractory for tapping hole construction and its application is relatively simple.

Fig. 5 shows a combination of the well-less method and the water-cooled melting zone and a cupola of this type is in regular daily production. By eliminating refractories wherever possible and particularly in the vulnerable areas, the possibility of continuous operation is foreseen.

Water-Cooled Basic Cupola

The basic process was perhaps the first attempt to obtain a degree of slag control in order to promote certain desirable reactions in the cupola furnace. Interest in the use of water cooling has been considerably increased by the possibility of applying it to the basic cupola and certain experimental work in this direction will now be discussed. In the original work[2] on the basic-lined furnace, a stabilized dolomite refractory lining was employed both in the well and the melting zone, the latter section being lined with this material to a height of 4 ft above the tuyeres.

Erosion with basic refractories approximates that obtained in the acid cupola, and the higher cost of basic material has no doubt hindered its general use except for special cases. By limiting the basic lining to the hearth area, considerable economy, it was thought, would obviously be effected, the desired conditions being obtained by employing a water-cooled melting zone.

The experiments were carried out on a production scale in the cupola described previously, using the conical melting zone fitted with water jackets, fig. 1(*d*); no basic material was used above the tuyeres except in the water-jacket recesses. The well was lined with stabilized dolomite bricks and the continuous-tapping box with the same material in rammed form. The hearth dimensions were such as to allow a normal slag bulk to be retained in the well, the greater slag volume having been proved advantageous in order to obtain the desired desulfurization.

Experimental Results

Tables I and II give details of the experimental charges and the results obtained, and show the extent of desulphurization with slags of suitable basicity. Desulphurization was found to increase with increasing weight of limestone in the charge —6.5 pct of base giving 40 pct desulphurization and 9.5 pct giving 60 pct, assessing the percentage reduction from the amount normally obtained with similar charges in the acid cupola.

The slag analyses indicated that the basicity increased with the additional limestone in the charge but was not in proportion to the weight of added base. In addition to basicity requirements, the sulphur-holding capacity of a slag is lowered considerably by the presence of iron oxide, and the slag bulk in the well allowed time for the iron oxide to be reduced by incandescent coke usually to less than 1.5 pct.

It has been shown earlier, that slag samples taken at the tuyere level reveal high iron-oxide content in this zone, and the power of the incandescent coke to react with the iron oxide in the slag accounts for the low iron conent in the finishing slag at the notch. This effect is more pronounced in the continuous-tapping cupola, where

TABLE I

Charge Data for Experimental Melts in Basic Cupola.

Melt No.	Limestone, lb	Flux Fluorspar, lb	Flux, pct	Weight of Metal Charge, lb	Coke Ratio	Melting Rate, tons/hr	Pig, pct	Scrap, pct	Steel, pct	Hours Prod.
1	65	10	7.5	1,000	7 : 1	4.5	63	24	13	4½
2	75	10	8.5	1,000						4½
3	85	10	9.5	1,000	6½ : 1	4.5	63	24	13	4½
4	95	20	11.5	1,000						4½
5	95	20	11.5	1,000	7 : 1	4.5	63	24	13	9

TABLE II.

Analyses from Experimental Melts in Basic Cupola.

Melt No.	Metal Analysis (Pct)							Desulphurization, pct	Slag Analysis (Pct)						
	TC	Silicon			Mn	P	S		SiO_2	CaO	MgO	Al_2O_3	FeO	MnO	CaO : SiO_2
		Calc.	Actual	Pct Loss											
1	3.39	2.80	2.35	16.0	0.77	0.10	0.067	39	.....	.....	.....	.....	.....	.....	.....
2	3.48	2.80	2.42	13.5	0.73	0.10	0.051	54	34.8	47.2	5.3	9.8	1.54	1.50	1.35 : 1.0
3	3.40	2.80	2.41	14.0	0.81	0.15	0.063	43	.....	.....	.....	.....	.....	.....	.....
4	3.45	2.80	2.28	18.6	0.90	.....	0.050	55	33.4	50.2	4.18	8.2	1.30	2.61	1.50 : 1.0
5	3.51	2.70	2.22	17.8	0.79	0.10	0.044	60	33.4	51.0	4.32	9.07	1.34	0.84	1.54 : 1.0
Acid cupola	3.36	.....	.....	.....	.....	.....	0.110	.....	48.0	31.2	1.50	14.1	2.20	2.20	0.65 : 1.0

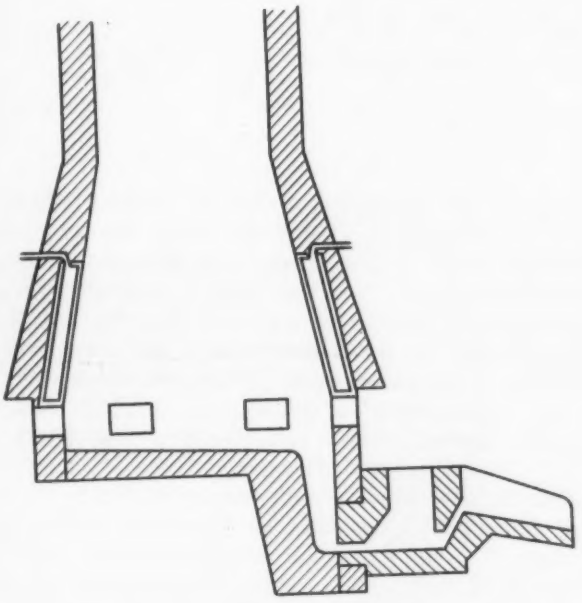


FIG. 5—Water cooled, well-less cupola with enlarged melting zone.

contact time between slag and coke is more prolonged.

Silicon loss varied between 14 and 20 pct, being higher than expected in an acid cupola, due, no doubt, to the increased amount of base available to react with the ferrous silicate formed in the first instance. The higher carbon pickup obtained under basic conditions verified the results previously reported, and the only explanation which can as yet be offered for this phenomenon of high-carbon pick-up is that the ash forming on the surface of the coke during combustion, being acid in nature, is more rapidly fluxed away by the action of a basic slag and leaves the ash-free coke surface more exposed to the metal for carbon absorption to take place. The ash content of the coke used for the melts reported, being somewhat high (12 pct), may explain the reason why the carbon pick-up, though greater than in an acid cupola, is not as high as quoted elsewhere.[3]

From the above remarks it will be seen that basic conditions suitable for desulfurization can be obtained in the water-cooled basic cupola and, by limiting the basic lining materials to the hearth, there is little difference in cost between this method and the acid cupola, particularly if allowance be made for the cost of ladle desulfurization with its attendant processing.

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[1] Bamford. B.I.S.R.C. Conference on "Cupola and Converter Refractories." *Foundry Trade Journal*, May 19, 1949.

[2] Renshaw, E. S. "Basic Cupola Process of Desulphurisation." *Foundry Trade Journal*, Vol. LXX, June 24, 1943.

[3] "Second Report on the Basic Cupola." *Proc. Inst. Brit. Foundrymen*, 1945/6, Vol. XXXIX.

New Books

"The Story of Magnesium," by W. H. Gross. Written in a non-technical manner, this book has chapters on production, alloying, melting and refining, casting, fabrication, and machining of magnesium. Also included are sections dealing with the physical metallurgy of magnesium, as well as a discussion of applications. American Society for Metals, 7301 Euclid Ave., Cleveland 3. $2.00. 262 p.

"Standards of TEMA, 1949." A handy manual covering fabrication, performance, general process applications, material specifications, heat transfer and pressure drop data, thermal properties of fluids, and installation, operation and maintenance of tubular heat exchangers. Tubular Exchanger Manufacturers Assn., 53 Park Place, New York 7. Paper cover, $3.00; Fabrikoid cover, $4.00. 94 p.

The Icosasphere,

By J. O. JACKSON

Vice-President,
Engineering and Research,
Pittsburgh-Des Moines Steel Co.
Pittsburgh, Pa.

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A NEW method for predicing the flow or displacement of materials in plates and sheets which are bent, formed, or drawn in such a manner that plastic flow occurs, has been developed by the Pittsburgh-Des Moines Steel Co., Pittsburgh.

This method of predicting plastic flow provides a new tool to help the research worker obtain solutions of layout problems in a much shorter time than would be possible by the cut and try method. This method consists of forming the desired object of a suitable plastic material, softened by heat and allowed to cool between dies or otherwise restrained to the desired shape. The edges of the piece are trimmed to the outline required, after which the trimmed piece is relaxed by heating to the softening point when it will flatten and assume the outline of a properly shaped flat piece, which, if dished or formed to shape, will flow plastically to produce a finished piece of the proper shape.

Fig. 1 illustrates such a determination being made in the research laboratory of the Pittsburgh-Des Moines Co. at the Mellon Institute of Industrial Research, Pittsburgh. The operator has just pressed a piece of Plexiglas to form one of the plates of a spherical shell and is checking it for accuracy. The pressing form and other pressed pieces may also be seen.

This process is applicable to any formed work where plastic flow is involved such as spherical tanks; wind tunnel flares, nozzles, contraction pieces; hemispherical, elliptical, and toroidal tank bottoms; and in any other dished, pressed, drawn, or warped plate work.

The first application of this method was to determine the shape and arrangement of plates to form a spherical tank shell with a minimum amount of scrap loss and a minimum footage of welded seam. Spherical tanks have been made with several plate layouts. The most common layout is the orange peel design, usually consisting of a top and bottom saucer with one or more courses of approximately vertical plates between. These vertical plates are wider near the center of the sphere and taper toward the top and bottom. Since these plates are tapered, two can be cut from one rectangular plate, which reduces scrap.

However, when this is done, the finished sphere plates are much narrower than the economical width; this results in a considerable increase in footage of welded seams over that resulting if only one sphere plate is cut from each rectangular plate. If plates of maximum width are cut singly to form the separate plates, the amount of scrap is excessive.

The cubical layout was developed some years ago in which rectangular plates were laid out on the sides of an imaginary rubber cube circumscribed by a sphere. The cube is then expanded until its faces touch the sperical shell. In expanding the cube to fit the sphere, all of the edges of the plates will become curved, but the plates will be more nearly rectangular in shape than the orange peel plates and the amount of scrap will in most cases be reduced.

In the study made by the plastic model method, several layouts were considered and quickly made on the dished plastic, relaxed, and the shape of the relaxed plates measured to determine the best layout.

Any layout of plates for a sphere involving a repeating pattern must be based on the faces of one of the five regular polyhedrons. These are the tetrahedron with four triangular faces; the hexahedron, or cube, with six square faces;

a New Spherical Tank Layout

SUMMARY: A method of designing and building welded spherical tanks and other double curved plate surfaces which gives reduction in scrap loss and welded footage is described herein. A sphere having this plate layout is called an Icosasphere, because the plates forming the shell of the sphere are similar to and arranged as those forming the shell of an icosahedron.

the octahedron with eight triangular faces; the dodecahedron with twelve pentagonal faces; and the icosahedron with 20 triangular faces.

The icosahedron may be built without scrap loss, as the triangles may be altered and cut from a rectangular plate without any waste. Four adjacent faces of an icosahedron may be flattened and they will form a parallelogram. Five of these parallelograms will form the entire surface of an icosahedron. These facts suggested that if a spherical shell were formed by five parallelogrammic units, each of which represented four adjacent triangular faces of the icosahedron expanded to the spherical surface, the layout might be the best one possible from a standpoint of scrap loss.

A sphere may be divided into 20 equilateral spherical triangles; however, it is not possible to divide the surface of a sphere into more than 20 equilateral triangles for the same reason that it is not possible to have a polyhedron of more than 20 faces which are identical.

The Icosasphere is, then, a sphere laid out along the expanded lines of four adjacent faces of an icosahedron. Five plates, cut the proper shape and dished, will form a complete sphere. These plates may be cut from one rectangular plate with a remarkably small scrap loss. As the size of the sphere increases, it is necessary to further subdivide the five parallelogramic units, and designs have been prepared based on subdividing each side into two, three, four, and eight subdivisions. Table I shows the excess steel required, expressed in square feet and in percent of the area of the sphere; also

FIG. 1—A pressed piece of Plexiglas being checked for accuracy. The pressing form and other pressed pieces may also be seen.

shown is the footage of joints, usually welded joints, required in each layout for three different sphere diameters. If the cost per foot of joint is added to the cost of scrap for any assumed thickness for the various layouts, the most economical layout may be determined.

Fig. 2 shows the erection and tack welding of the plates forming an Icosasphere of 32 ft 5 in. ID. The plates were ½-in. thick. The shell is formed of only 20 plates, and is supported on five columns. Note the large pipes which connect the sphere to the supersonic wind tunnel test chamber.

Fig. 3 shows the completed sphere. The sphere was erected in a single day, but welding of the seams took many days. After completion, the shell was tested to 100 psi hydraulic internal pressure, which it withstood satisfactorily. The shell was designed for an external working pressure of one atmosphere. The high internal pressure test of about 6.8 times the external working pressure of the sphere was for the purpose of removing flat spots and rounding out the surface of the sphere so that it would more effectively resist the external pressure.

The design and construction of the Icosasphere is covered by patent applications owned by the Pittsburgh-Des Moines Co.

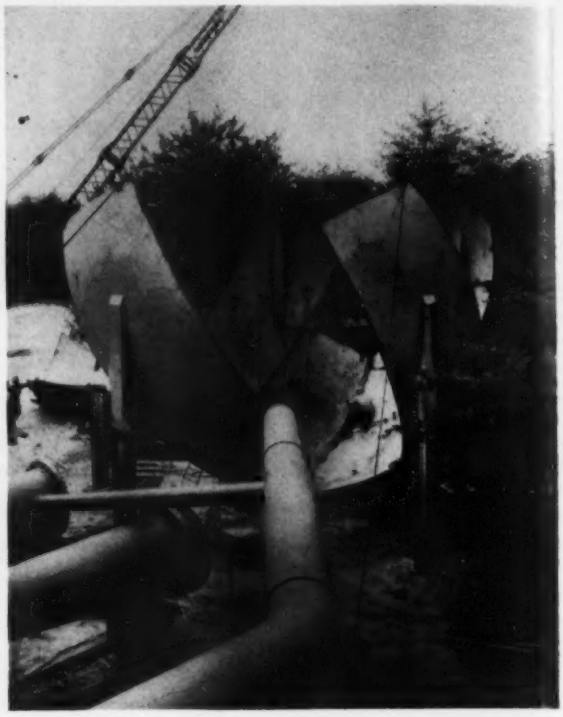


FIG. 2—Erection and tack welding of the Icosasphere in an early stage, showing the rectangular shape of the plates.

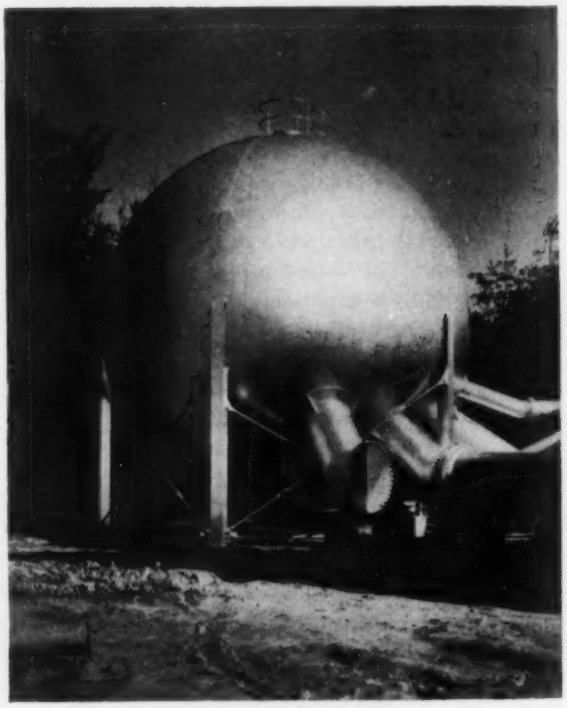


FIG. 3—The completed Icosasphere, over 32 ft in diameter, and formed of only 20 shell plates.

TABLE I

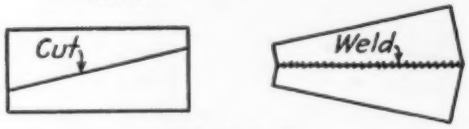
Comparison of Material Required and Seam Footage for Different Sphere Layouts.

Layout	No. of Plates	Ordered Excess[1]		Feet of Seam
		sq ft	Pct	
10-ft diam spheres				
Icosasphere	5	57	18	83
Orange peel[2]	6	125	40	96
Cube layout	6	62	20	70
20-ft diam spheres				
Icosasphere	20	221	11	423
Orange peel[2]	12	670	34	362
Orange peel[3]	32	447	23	600
Cube layout	18	367	19	420
50-ft diam spheres				
Icosasphere	48	888	11	1418
Orange peel[2]	40	3460	44	1548
Orange peel[3]	50	1609	21	1903
Orange peel[4]	32	860	11	1058 (shop) 1265 (field) 2323 (total)
Cube layout	30	1224	16	1279

Notes: [1] Ordered excess is area ordered less area of sphere expressed in sq ft and in percent of sphere area.
[2] Plates cut one sphere plate from one rectangular plate.
[3] Plates cut two sphere plates from one rectangular plate as in sketch A.

Sketch A

[4] Plates cut diagonally in half and rewelded in shop as in sketch B.



Sketch B

Direct Determination of IRON in BRASS and BRONZE

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A NONFERROUS control laboratory is often called upon to determine a single element in a sample of brass or bronze. Tin is easily separated as oxide in nitric acid solution, copper may be determined iodometrically, and lead may be isolated electrolytically or as lead sulfate. However, when nickel or iron is to be determined, it is necessary to separate the tin, antimony, copper and lead before proceeding with the customary methods of analysis for those elements. A method for the rapid and direct estimation of nickel in brass and bronze has been previously reported.[1]

In seeking a direct method for iron, it was assumed that a colorimetric determination would be best because of rapidity, convenience and fewer separations. Ordinarily, the sample is dissolved in nitric acid, tin and antimony oxides are filtered, and copper and lead removed by electrolysis. Iron is then determined by the thiocyanate colorimetric method.[2] Although separation of copper by displacement with aluminum in a weak sulfuric acid solution[3] has been used for some time, it was not at first considered as a possibility in this investigation, since the time required to displace the copper from a 1 g sample is from 10 to 15 min. Also, fuming the sample with sulfuric acid made a cooling period necessary before the concentrated sulfuric acid could be diluted with water.

Experiments showed, however, that an aliquot (1/25) of the solution could be used for copper displacement without loss of accuracy, and that displacement from a hydrochloric acid solution eliminated the tedious sulfuric acid fuming. Only one filtration is necessary (copper), and the filtration is very rapid because the quantity of copper to be filtered is small and the volume of solution is only 25 ml. The red color of the reaction between the ferric ion and thiocyanate is developed in the filtrate.

Although many substances are known to interfere in the thiocyanate test for iron,[4] only phosphorus, when present in amounts greater than 0.05 pct caused error in some of the many sample runs. Table I shows the degree of error to be expected in the iron reading with varying amounts of phosphorus. All samples actually contained 5 mg Fe.

Plotting the phosphorus content against the colorimeter readings shows that interference is directly proportional to phosphorus content. Consequently, if the amount of phosphorus present in the sample is known, one may read the appar-

SUMMARY: A method for colorimetric determination of iron in brass and bronze is described, which requires considerably less time than conventional chemical analysis and gives greater accuracy because of elimination of iron loss.

ent iron content and add to it the figure for phosphorus multiplied by 0.28 to get the actual iron content. If the phosphorus percentage is unknown, and the sample obviously contains more than 0.05 pct, it is best to use a colorimetric method based upon the ferrous ion, such as the method outlined by Goodman.[5]

Silicon, if present, is filtered off prior to the displacement of copper. The method is not applicable to beryllium bronze (which may contain cobalt) nor to brass or bronze containing silver, since both those elements interfere[4] in the thiocyanate test for iron.

The entire procedure requires about 15 min against 1¼ hr for the indirect method. Two colorimeter curves were plotted, one for 250 ml volume and the other for 100 ml. The latter has the range of 0.004 to 0.20 pct Fe, the former 0.01 to 0.60 pct Fe. The weight of sample taken is such that the iron content will fall between those ranges.

TABLE I

Effects of Phosphorus Content on Iron Determination.

Phosphorus Present (added as H_3PO_4O), Mg	Apparent Iron Reading, Mg
5.0	3.5
4.0	3.8
3.0	4.1
2.0	4.4
1.0	4.7
0.5	5.0

In the testing procedure, the sample is transferred to a tall (500 ml) beaker and 10 ml conc hydrochloric acid added. A cover is placed on the beaker and 25 ml of 30 pct hydrogen peroxide are added slowly, so that the strong initial reaction will not cause the solution to foam over the top of beaker. When the initial reaction has subsided, the sides of the beaker and the cover are washed down and the solution heated for a moment. If some few specks of the sample are still undissolved (this rarely happens) a few drops of the 30 pct hydrogen peroxide are added and the solution warmed again to complete solution of the alloy.

The solution is then transferred to a 250-ml volumetric flask and diluted to the mark. The flask is inverted 30 times to be sure of thorough mixing. Ten ml of the solution are then pipetted (use a Pipettor or similar mechanical aid) into a 50-ml beaker and a 1-in. wide strip of clean, iron-free aluminum is bent over the lip of the beaker so that its other end almost touches the bottom of the beaker. Bring the solution to a boil and boil 2 min. Wash the strip down with cold water, filter the flask and wash the residue once with cold water. Discard the filter paper, wash down the funnel and add to the solution 1 ml conc hydrochloric acid, 1 ml 3 pct hydrogen peroxide (to prevent fading of the color to be developed) and 25 ml 10 pct ammonium or alkali thiocyanate. Mix well, dilute to the mark and mix well again.

After 5 min measure the light transmission of the solution of the red complex at 525 mu. Although the color increases for 15 min, all readings taken at 5 min are comparable and therefore valid. The standard iron curves were constructed by taking given amounts of c.p. iron and treating exactly as described above. The author used a Fisher Electrophotometer, ac model, and a 525 mu (green) filter for the measurements but any sensitive colorimeter will, no doubt, do as well. Typical results, using various Bureau of Standards samples, are shown in table II.

It may be noted that whereas in the indirect method for iron some of that element is lost due to its retention by the tin and antimony oxides precipitate,[6] that error is eliminated in the direct method. No loss of iron, because of distillation of ferric chloride when the solution is heated, could be found. Analysis of the combined copper residues from 25 determinations showed that less than 0.001 pct Fe was retained by the copper residue. Nickel, because of the weak blue color of its chloride, might be expected to interfere, but the use of a small aliquot of the solution prior to the copper displacement and development of the red complex weakens the effect so that as much as 20 pct Ni may be present without interference. Some of the advantages of the method not hitherto mentioned are as follows: (1) the acidity of the solution is not critical, (2) small temperature differences of the solution do not interfere, and (3) the reagents used are readily available and inexpensive.

TABLE II

Results of Typical Tests Run on Standard Samples.

Bureau of Standards Sample No.	Iron Present, Pct	Iron Found, Pct
B. S. 62b—Manganese Bronze (0.5 g sample)	0.81	0.81 0.81 0.82
B. S. 63a—Phosphor Bronze (0.58 pct P. Iron corrected for phosphorus)	0.52	0.50 0.52 0.52
B. S. 52a—Cast Bronze	0.06	0.05 0.06 0.05
B. S. 37c—Sheet Brass	0.17	0.17 0.19 0.17
B. S. 124a—(85-5-5-5)	0.002	0.002 0.002 0.002

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[1] C. Goldberg, Foundry (not yet published).
[2] W. W. Scott, "Standard Methods of Chemical Analysis," Vol. I, D. Van Nostrand Co., New York, 1939.
[3] W. W. Scott, "Standard Methods of Chemical Analysis," Vol. I, p. 358, D. Van Nostrand Co., New York, 1939.
[4] W. W. Scott, "Standard Methods of Chemical Analysis," Vol. I, p. 463, D. Van Nostrand Co., New York, 1939.
[5] W. Goodman, Anal. Chem., 19, p. 141.
[6] G. W. Slomin, "Rapid Quantitative Electrolyic Methods of Analysis," p. 12, 7th edition, Sargent & Co., Chicago, 1945.

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This article is an extended abstract of a report published in the Bulletin of the Russian Academy of Sciences in the January 1949 issue. The report was translated by S. L. Case, research engineer, Battelle Memorial Institute, Columbus, Ohio, who evaluated the significant data from the report and compiled the accompanying article. The text represents a free translation by Mr. Case and contains comments expressed by him.

VANADIUM as a DEOXIDIZER

SUMMARY: Disagreement among metallurgists over deoxidizing properties of vanadium in steelmaking is somewhat clarified in this report of Russian work. The derivation of equilibrium constants of vanadium in liquid iron is outlined and relative deoxidation characteristics of vanadium and silicon are presented. Data obtained are held to be in close agreement with known behavior of vanadium in steelmaking processes.

ALTHOUGH the use of vanadium in steelmaking is continuously expanding and some of the most effective complex deoxidizers are vanadium-bearing, until now, experimental steelmaking data on the deoxidizing powers of vanadium have been very meager in scope. Chipman's thermodynamic calculations[1, 2] of the effectiveness of vanadium as a deoxidizer were derived from available values of the heat of formation of the oxide V_2O_3. According to these calculations, vanadium is a stronger deoxidizer than silicon. As an example, at 2910° F, a vanadium content of 0.2 pct is stated to be in equilibrium with 0.007 pct oxygen in steel, while a similar silicon content is in equilibrium with 0.014 pct oxygen at the same temperature.

Deoxidization values assigned to vanadium by Chipman are not in agreement with the practical experience of steelmakers who find that the oxidation of vanadium in a steel bath lags appreciably behind the oxidation of silicon and who claim that a low carbon steel may have a vanadium content of 0.3 pct and, yet, contain sufficient oxygen to show a good rimming action during freezing[3].

In a recent paper[4], Chipman offers an explanation of why his earlier calculated values of the deoxidizing powers of vanadium were so high. According to the later studies, the deoxidizing power of vanadium cannot be shown by a single line on a deoxidation diagram. Two lines are required, one for activity of oxygen, the other for its percentage by analysis. The activity curve shows a change in slope at a vanadium content of 0.2 pct, which is attributed by Chipman to a change in the oxide phase from V_2O_3 at higher vanadium concentration to an iron-vanadium spinel $FeO{\cdot}V_2O_3$ at lower concentrations of vanadium.

In view of the uncertain nature of available data, a gratifying contribution to this subject is a recent systematic investigation by two Russian workers, Samarin and Poliakov[5]. This study appears to be a serious and well-planned scientific

Vanadium As A Deoxidizer

Continued

work and does not seem to suffer from ideological bias.

In the following text, the present writer has undertaken to present significant data from Samarin and Poliakov's paper in a free translation of their own words, or, at least, in the spirit of the original.

In the investigation, the oxidizing powers of vanadium were derived from the relative behavior of vanadium and silicon in molten steel subjected to slow oxidization while it was kept molten in a high-frequency induction furnace of 110 lb capacity. Magnesite with a boric acid binder (2.5 pct by weight) was used in the preparation of the crucible. A platinum-platinum-rhodium thermocouple with a quartz protection tube was employed in temperature measurements. Before each immersion, the power was shut off and the slag was skimmed off the surface of the bath.

Steel scrap of the following composition was used as melt-down charge: 0.05 C, 0.35 Mn, trace Si, 0.025 S and 0.020 P. A ferrosilicon alloy containing 72 pct Si was used for silicon additions; ferrovanadium with a vanadium content of 70 pct was a source of vanadium. The initial vanadium content of all experimental melts was aimed at 1 pct and, as indicated in table I, it ranged from 0.64 to 1.25 pct at the time the first test was taken. The initial silicon content of the series of melts was intentionally varied from 0.14 pct on melt No. 1 to 1.86 pct on melt No. 7 (table I).

Specimens for chemical analysis were obtained by immersing in the bath and then rapidly withdrawing a clean steel rod. Slag was carefully skimmed off the surface before taking each sample. The first sample was always taken immediately after the vanadium additions were made; the second sample followed in 15 min, and the others were spaced at 30-min intervals. Temperature of the bath was taken after each sampling.

The progress of the oxidation of vanadium and silicon in a molten steel bath held for various periods under an atmosphere of air is shown in table I. The outstanding difference in the behavior of vanadium and silicon under slow oxidation conditions prevailing in these tests is

TABLE I

Oxidation of Silicon and Vanadium in the High-Silicon Series of Melts

Melt No.	Test No.	Holding Time of Melt, Min.	Temperature °C	Temperature °F	Alloy Content V, Pct	Alloy Content Si, Pct	Slag Characteristics
1	1	4	1660	3020	0.95	0.14	liquid
	2	19	1690	3075	0.92	0.10	liquid
	3	46*	1730	3145	0.77	0.07	solid
	4	73	1680	3055	0.54	0.06	solid
	5	88	1655	3010	0.41	0.047	solid
2	1	2	....	....	1.25	0.24	liquid
	2	17	....	3130	1.18	0.15	liquid
	3	49*	....	2875	1.01	0.08	solid
	4	79	....	2875	0.92	0.07	solid
3	1	5	....	....	1.23	0.24	liquid
	2	20	....	....	1.20	0.17	liquid
	3	35	....	2985	1.17	0.15	liquid
	4	65*	1700	3090	1.10	0.08	solid
	5	95	1700	3090	0.95	0.06	solid
4	1	3	1600	2910	1.18	0.36	liquid
	2	20	....	....	1.16	0.29	liquid
	3	50	1520	2770	1.10	0.15	liquid
	4	80	1600	2910	1.05	0.10	liquid
	5	110	1670	3040	0.97	0.06	liquid
	6	140*	1650	3000	0.56	0.04	solid
5	1	5	1610	2930	1.12	0.43	none visible
	2	20	....	....	1.12	0.31	none visible
	3	50	1600	2910	1.03	0.18	none visible
	4	81*	....	....	0.93	0.09	solid
	5	111	....	....	0.86	0.065	solid
	6	141	....	....	0.55	0.019	solid
6	1	3	....	....	0.64	0.27	none visible
	2	18	1650	3000	0.62	0.15	none visible
	3	48	1660	3020	0.55	0.03	none visible
	4	78*	1580	2875	0.48	0.018	solid
	5	108	1610	2930	0.19	0.010	solid
	6	138	1590	2895	0.07	0.010	solid
7	1	2	1700	3090	1.08	1.86	none visible
	2	17	1680	3055	1.03	1.11	none visible
	3	47	1680	3055	1.08	0.90	none visible
	4	77	1680	3055	1.08	0.72	liquid
	5	107	1660	3020	0.97	0.55	liquid
	6	137	1680	3055	0.98	0.36	liquid
	7	167	1680	3055	0.90	0.16	liquid
	8	197*	1570	2860	0.74	0.047	solid

* Solid slag formed at this stage.

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TABLE II

Composition of Slag in Low-Silicon Melts Containing Vanadium

Melt No.	Test No.	Holding Time of Melt, Min.	Temperature °C	Temperature °F	Composition of Melt, Pct V	Composition of Melt, Pct C	Composition of Melt, Pct Si	Slag Composition, Pct* V	Slag Composition, Pct* Fe	Slag Composition, Pct* SiO_2	Slag Composition, Pct* MgO	Remarks
8	1	6			1.15	0.43	tr					no slag
	2	24	1550	2820	1.03	0.35	tr	19.20	58.70		0.75	solid slag
	3	54	1640	2985	1.00	0.26	tr	19.20	63.45		0.29	solid slag
	4	84	1640	2985	0.89	0.17	tr					solid slag
	5	114	1700	3090	0.72	0.15	tr					solid slag
	6	144	1670	3040	0.43	0.08	tr	25.10	52.24		0.46	solid slag
9	1	4	1580	2375	0.97	<0.05	0.065					no slag
	2	20	1660	3020	0.98		0.047	16.1	42.00	12.48	5.13	solid slag
	3	40						14.4	40.78	15.12	5.72	solid slag
	4	50	1630	2965	0.67		0.035	17.4	41.05	8.00	2.60	solid slag
	5	80			0.52		0.023	21.0	39.00	11.72	5.22	solid slag
	6	95						22.6	38.08	8.40	3.82	solid slag
	7	110			0.33		0.023	24.8	41.12	6.28	2.95	solid slag
	8	125						25.4	44.71	6.08	1.04	solid slag
	9	140			0.14		0.023	22.5	40.80	7.80	2.77	solid slag
	10	155			0.09		0.023	22.8	35.57	12.80	4.25	solid slag

* After each slag test was taken, remaining slag was skimmed off the surface of the metal and new slag was formed by oxidation of the bath.

in the rate of oxidation of these elements as a function of holding time and of the ratio of the initial silicon and vanadium contents in the various melts. The higher the initial silicon content of the bath, the slower was the oxidation of vanadium. In fact, intensive oxidation of vanadium at all temperatures employed in these experiments did not begin until the silicon content of the bath dropped below approximately 0.06 pct.

As an example, in melt No. 4, in which the initial silicon and vanadium contents were 0.36 and 1.8 pct, respectively, after 20 min holding time, about 20 pct of the initial silicon content was lost through oxidation, while the vanadium content was lowered by less than 2 pct; after 110 min holding time, 80 pct of the initial silicon content and only 18 pct of the initial vanadium content were oxidized. The rate of oxidation of vanadium in this melt was sharply accelerated only when the residual silicon content dropped to 0.04 pct, after 140 min holding time.

In melt No. 7, in which the initial silicon and vanadium contents were 1.86 and 1.08 pct, respectively, 40 pct of the silicon and less than 5 pct of the vanadium were lost through oxidation after 17 min holding time. In 167 min, 90 pct of the silicon and only about 17 pct of the vanadium was oxidized from the melt. In this case, again, the oxidation of vanadium started to progress more intensively only when the residual silicon dropped below 0.05 pct.

An interesting feature observed in the oxidation experiments was the difference in the type of slag formed during the various stages of oxidation of vanadium. As long as the oxidizing element was predominantly silicon, the slag was liquid. As soon as the rate of oxidation of vanadium was accelerated, the consistency of the slag changed to a spongy solid film. The change from a liquid to a solid slag was sudden and furnished a sharp point of demarkation between the two periods of oxidation, the silicon period and the vanadium period. In table I, the line of demarkation between the two periods of oxidation is indicated by an asterisk following the time interval when the bath test was taken.

While the composition of the liquid slag appears to be mostly silicates, the solid slag was shown by chemical analysis and petrographic examination to be predominantly a heterogeneous mixture of iron-vanadium spinel ($FeO{\cdot}V_2O_3$) and silicates of iron, magnesia, etc.

Solid Slags Heterogeneous Mixtures

This was further verified by a study of slags formed during the oxidation of a steel melt containing vanadium and carbon with only a trace of silicon and another melt to which no carbon was added, and the initial vanadium and silicon contents were 0.97 and 0.065 pct, respectively. Results of these tests are given in table II.

The magnesium oxide in the slag resulted from the erosion of the crucible. Ignoring this slight contamination, slag from melt 8 appears to be an iron-vanadium spinel dissolved in iron oxide. Slag from melt 9 is more heterogeneous but is also of the same type. A petrographic examination of slags formed on all vanadium-containing melts showed that when the silicon content of the bath dropped to 0.06 pct, or under, the slag formed by the oxidation of vanadium did not contain free vanadium oxide but a compound $FeO{\cdot}V_2O_3$. On silicon-free, vanadium-containing melts, such as melt 8, the slag contains approximately 30 pct V_2O_3 and 70 pct FeO and consists, therefore, of approximately 45 pct spinel and 55 pct free FeO.

It is of interest to observe that in melt 8 (table II) the rate of oxidation of carbon at steelmaking temperatures is considerably higher than the rate of oxidation of vanadium. For example, after a holding time of 84 min, 60 pct of the initial carbon content of the bath was oxidized, while only 23 pct of the vanadium was lost; after a holding time of 144 min, the oxidation of carbon and vanadium reached 80 and 60 pct, re-

spectively. Vanadium appears to be, therefore, a weaker deoxidizer than carbon.

Interpretation of Results

In the oxidation experiments just described, oxygen from the atmosphere continuously reacted with the melt and diffused through the bath. While there was, therefore, no true condition of equilibrum, rate of oxidation was relatively slow and the concentration of oxygen in the metal at any given time was presumably very near equilibrum with the elements which were being intensively oxidized at that time.

In view of the fact that in all experimental melts the silicon was preferentially oxidized in the early period, it is natural to assume that at that stage of oxidation, the oxygen content of the bath was controlled by silicon and was governed, therefore, by the following reaction*:

$$[Si] + 2[FeO] = (SiO_2)_{solid} + 2\,Fe_{liquid}$$

$$K'_{Si} = [Si, \%]\,[FeO, \%]^2; \quad [FeO, \%] = \sqrt{\frac{K'_{Si}}{[Si, \%]}} \qquad (1)$$

** The use of brackets in the equations in this article denotes concentration in the metal phase; parenthesis denote concentration in the slag phase.—Ed.*

Intensive oxidation of vanadium did not take place until the concentration of oxygen, which was increasing continuously with decreasing silicon in accordance with equation (1), finally exceeded a concentration that was in equilibrum with the vanadium concentration in the metal.

Since a petrographic examination of the slags formed over the oxidizing melt indicated that the product of the reaction between oxygen and vanadium present in liquid steel is not a free oxide V_2O_3 but a solid spinel $FeO{\cdot}V_2O_3$, insoluble in the metal bath, the concentration of oxygen at the period of intensive oxidation of vanadium is governed by the following reaction:

$$[V] + 2[FeO] = \frac{1}{2}\,(FeO \cdot V_2O_3)_{solid} + \frac{3}{2}\,Fe_{liquid}$$

$$K'_V = [V, \%]\,[FeO, \%]^2; \quad [FeO, \%] = \sqrt{\frac{K'_V}{[V, \%]}} \qquad (2)$$

During the second stage of oxidation when both silicon and vanadium are being oxidized, the FeO content of the bath must satisfy both equations (1) and (2), hence:

$$\sqrt{\frac{K'_V}{[V, \%]}} = \sqrt{\frac{K'_{Si}}{[Si, \%]}}$$

or,

$$K'_V = K'_{Si} \cdot \frac{[V, \%]}{[Si, \%]} \qquad (3)$$

Equation (3), which should hold true not only for the beginning of intensive oxidation of vanadium but also for the entire subsequent period of oxidation, was used by Samarin and Poliakov for the quantitative evaluation of the equilibrium constant in the reaction of vanadium oxidation from a liquid iron bath:

$$K'_V = [V, \%]\,[FeO, \%]^2$$

In table III are shown the values of equilibrium constants derived from experimental data obtained during the period of intensive vanadium oxidation. It is assumed that the slight oxidation of vanadium during the earlier period of the melt was due to localized oxidation of vanadium in the upper layer of the melt where the concentration of oxygen was considerably higher than in the rest of the molten bath. Only one bath test from melt 5 was included in the calculation shown in table III because no temperature measurements were made on the rest of the tests from this melt. The values of Log K'_{Si} given in colum 9 of table III were derived from equation (4):

$$[Si] + 2\,[O] = SiO_{2solid}; \quad \Delta F^\circ = 119180 - 43.5T$$

$$\log K_{Si} = \frac{119180}{4.575T} + \frac{43.5}{4.575} = \frac{26051}{T} + 9.508 \qquad (4)$$

From this constant, the log of K'_{Si} shown in reaction (1) is calculated:

$$\log K'_{Si} = \log K_{Si} + 2 \log 4.5;$$

$$\log K'_{Si} = -\frac{26051}{T} + 10.814 \qquad (5)$$

There is relatively little fluctuation in the ratio of vanadium to silicon during the stage of intensive vanadium oxidation (column 6, table III) regardless of the great variation in the initial vanadium and silicon contents of the experimental melts as indicated in table I. This relative stability of the ratio $\frac{V}{Si}$ during this stage of oxidation is indirect proof of the validity of equation (3) used in calculating the equilibrium constants of vanadium oxidation in liquid iron.

The calculated values of log K'_V (column 10, table III) were plotted by Samarin and Poliakov[5] in fig. 1 as a function of the reciprocals of the absolute temperatures. The most probable straight line drawn through the plotted points answers the following equation:

$$\log K'_V = -\frac{21000}{T} + 9.25 \qquad (6)$$

Equation (6) furnishes the following thermodynamic values for the reaction of vanadium oxidation in molten iron:

$$[V] + 2\,[FeO] = \frac{1}{2}\,(FeO \cdot V_2O_3)_{solid} + \frac{3}{2}\,Fe_{liquid}$$

$$\Delta F^\circ = -96075 + 42.32\,T \qquad (7)$$

Within the range of steelmaking temperatures, the following values for the thermodynamic functions $\triangle H$ and $\triangle S$ may be accepted as approximately true:

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TABLE III

Equilibrium Constants of Vanadium Oxidation in Liquid Iron[5]

(1)	(2)	(3)		(4)	(5)		(6)	(7)	(8)	(9)	(10)
		Temperature			Alloy Content of Melt, Pct						
Melt No.	Test No.	°C	°F	$\frac{1}{T} \cdot 10^4$	V	Si	$\frac{[V, Pct]}{[Si, Pct]}$	K'Si	$K'V = K'Si \cdot \frac{[V, Pct]}{[Si, Pct]}$	Log K'Si	Log K'V
1	2	1690	3075	5.094	0.92	0.10	9.2	$3.47 \cdot 10^{-3}$	$3.192 \cdot 10^{-2}$	−2.46	−1.496
	*	1710	3110	5.043	0.85	0.085	10.0	$4.70 \cdot 10^{-3}$	$4.790 \cdot 10^{-2}$	−2.32	−1.319
	3	1730	3145	4.993	0.77	0.07	11.0	$6.31 \cdot 10^{-3}$	$6.941 \cdot 10^{-2}$	−2.20	−1.158
	4	1680	3055	5.120	0.54	0.06	9.0	$3.02 \cdot 10^{-3}$	$2.718 \cdot 10^{-2}$	−2.52	−1.566
	5	1655	3010	5.188	0.41	0.047	8.7	$2.0 \cdot 10^{-3}$	$1.74 \cdot 10^{-2}$	−2.70	−1.759
2	*	1650	3000	5.200	1.09	0.11	9.9	$1.91 \cdot 10^{-3}$	$1.891 \cdot 10^{-2}$	−2.72	−1.723
	3	1580	2875	5.397	1.11	0.08	13.9	$5.75 \cdot 10^{-4}$	$7.992 \cdot 10^{-3}$	−3.24	−2.097
	4	1580	2875	5.397	0.92	0.07	13.1	$5.75 \cdot 10^{-4}$	$7.532 \cdot 10^{-3}$	−3.24	−2.123
3	3	1640	2985	5.228	1.17	0.15	7.8	$1.58 \cdot 10^{-3}$	$1.232 \cdot 10^{-2}$	−2.80	−1.909
	*	1670	3040	5.147	1.13	0.11	10.2	$2.57 \cdot 10^{-3}$	$2.621 \cdot 10^{-2}$	−2.59	−1.581
	4	1700	3090	5.068	1.10	0.08	13.7	$4.07 \cdot 10^{-3}$	$5.572 \cdot 10^{-2}$	−2.39	−1.254
	5	1700	3090	5.068	0.96	0.05	16.0	$4.07 \cdot 10^{-3}$	$6.512 \cdot 10^{-2}$	−2.39	−1.186
4	5	1670	3040	5.147	0.97	0.08	12.1	$2.57 \cdot 10^{-3}$	$3.109 \cdot 10^{-2}$	−2.59	−1.507
	*	1665	3030	5.160	0.87	0.07	12.4	$2.40 \cdot 10^{-3}$	$2.976 \cdot 10^{-2}$	−2.62	−1.526
	6	1650	3000	5.200	0.56	0.04	14.0	$1.91 \cdot 10^{-3}$	$2.674 \cdot 10^{-2}$	−2.72	−1.573
5	4	1600	2910	5.339	0.93	0.09	10.3	$8.13 \cdot 10^{-4}$	$8.370 \cdot 10^{-3}$	−3.09	−2.080
6	4	1580	2875	5.397	0.48	0.018	26.6	$5.75 \cdot 10^{-4}$	$1.529 \cdot 10^{-2}$	−3.24	−1.815
	5	1610	2930	5.310	0.19	0.01	19.0	$9.77 \cdot 10^{-4}$	$1.856 \cdot 10^{-2}$	−3.01	−1.731
	6	1590	2895	5.368	0.07	0.01	10.0	$6.92 \cdot 10^{-4}$	$0.69 \cdot 10^{-2}$	−3.16	−2.161
7	7	1680	3055	5.120	0.90	0.16	5.6	$3.02 \cdot 10^{-3}$	$1.691 \cdot 10^{-2}$	−2.52	−1.772
	*	1635	2975	5.240	0.835	0.115	7.25	$1.44 \cdot 10^{-3}$	$1.044 \cdot 10^{-2}$	−2.84	−1.981
	8	1570	2860	5.424	0.74	0.047	15.7	$5.01 \cdot 10^{-4}$	$7.866 \cdot 10^{-3}$	−3.30	−2.104

* First indication of a solid film in the slag formed over the melt.

$\Delta H = -96{,}075$ cal; $\Delta S = 42.32$ cal per degree

From equation (6), the constant K'_V for steelmaking temperatures of 2910°, 3000° and 3090°F has the following approximate values: 1.09×10^{-2}; 2.19×10^{-2}; and 4.07×10^{-2}, respectively.

The equilibrium curves for oxygen and residual vanadium at the three steelmaking temperatures based on the calculated constants are shown in fig. 2. For comparison, oxygen-silicon curves for the same temperatures and a vanadium-oxygen curve for 2910°F, based on Chipman's work,[1,2] are plotted in the same figure. It is quite evident that, at steelmaking temperatures, vanadium is a much weaker deoxidizer than silicon. As an example, at 2910°F a residual vanadium content of 0.2 pct is at equilibrium with 0.053 pct oxygen; a similar silicon content is at equilibrium with 0.012 pct oxygen. It is of interest to note that the curve based on Chipman's data shows 0.005 pct oxygen at equilibrium with 0.2 pct V, i.e., it assigns to vanadium

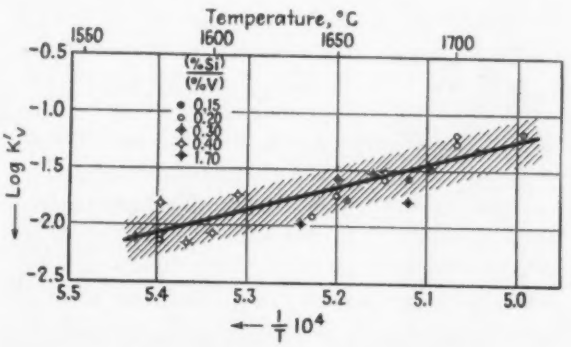

FIG. 1—Effect of temperature on oxidation constant of vanadium[5].

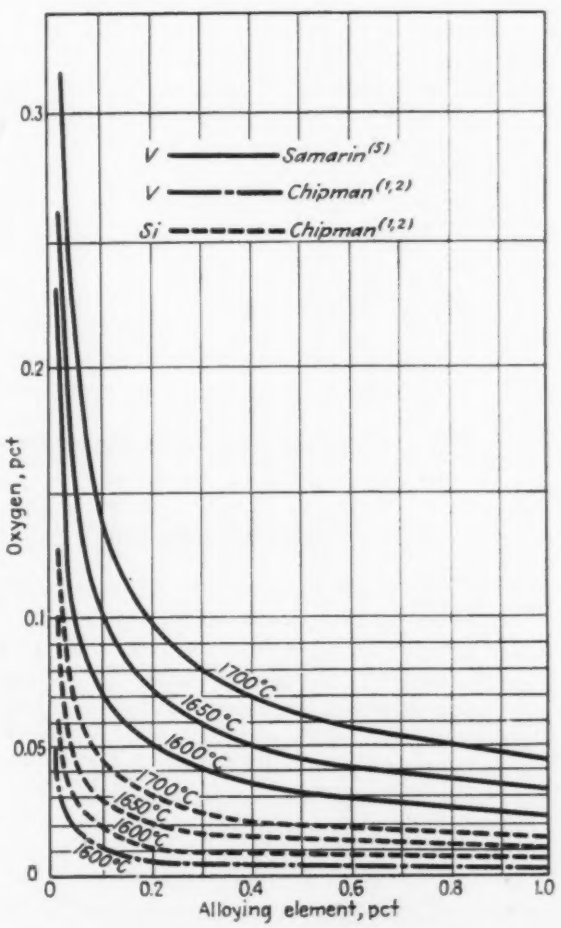

FIG. 2—Comparative deoxidizing powers of vanadium and silicon.

a ten-fold greater deoxidizing power than that indicated in Samarin and Poliakov's experi-

It is admitted by Samarin and Poliakov that the equilibrium relationship they found for residual vanadium and oxygen contents in liquid iron, has an accuracy of only ±25 pct. This is shown by the scatter of experimental points on fig. 1. Table IV illustrates the degree of accuracy on the calculated values if the width of the scatter band is taken into consideration.

In view of the fact that the difference between the values of the deoxidizing powers of vanadium derived from the present experiments and those calculated by Chipman[1,2] are of the order of 1000 pct, the deviation of ± 25 pct in the experimental data does not appear to be very significant.

From the experimental data, Samarin and Poliakov drew the following conclusions:

(1) When silicon and vanadium are both present in liquid iron, silicon exerts a retarding effect on the oxidation of vanadium. When the vanadium content in the bath is under 1 pct, intensive oxidation of vanadium does not begin until the silicon content drops to a value under 0.1 pct.

(2) The most probable occurrence of vanadium in the slag formed during oxidation of vanadium in liquid iron is in the form of an iron-vanadium spinel $FeO{\cdot}V_2O_3$, the presence of which assures the separation of the end products of vanadium oxidation in the form of a solid slag.

(3) The quantitative evaluation of the equilibrium constant of vanadium oxidation in liquid iron with the simultaneous oxidation of silicon may be derived from the equation:

$$K'_V = K'_{Si}\frac{[V,\ \%]}{[Si,\ \%]}$$

(4) On the basis of data obtained in the oxidation of iron melts containing both vanadium and silicon, the following thermodynamic functions were determined with a reasonable degree of accuracy:

$$V] + 2\,[FeO] = \frac{1}{2}\,(FeO \cdot V_2O_3)_{solid} + \frac{3}{2}\,Fe_{liquid};$$

$$\Delta F^\circ = -96075 + 42.32\ T$$

$$\log K'_V = -\frac{21000}{T} + 9.25$$

(5) The vanadium-oxygen equilibria in liquid iron at temperatures of 2910°, 3000° and 3090°F indicate that the deoxidizing power of vanadium at these temperatures is very much weaker than that of silicon. If the equilibrium constants for silicon oxidation at these temperatures[6] are 8.13×10^{-4}; 1.90×10^{-3}; and 4.07×10^{-3}, respectively, the corresponding equilibrium constants for vanadium oxidation are materially higher, i.e., 1.09×10^{-2}; 2.19×10^{-2}; and 4.07×10^{-2}. These constants appear to be in line with the known behavior of vanadium in steelmaking processes.

TABLE IV

Variations in Vanadium-Oxygen Equilibrium Values Calculated From Fig. 1

[V, Pct]	[Oxygen, Pct] Based on Equation (6)	Based on Upper Limits of Scatter Band	Based on Lower Limits of Scatter Band	Deviation, Pct Plus	Minus
0.1	0.1040	0.130	0.083	25	20
0.2	0.0735	0.092	0.059	25	20
0.5	0.0465	0.058	0.037	25	20
1.0	0.0328	0.041	0.026	25	20

References

[1] John Chipman, "Application of Thermodynamics to the Deoxidation of Liquid Steel," Trans. ASM, 22, 1934, p. 385.
[2] John Chipman, "Physical Chemistry of Liquid Steel," Basic Open Hearth Steelmaking, AIME, 1944.
[3] Samuel Epstein, U. S. Patent 2,356,450, Aug. 22, 1944.
[4] John Chipman, "Another Look at the Problem of Steel Deoxidation," Metal Progress, August 1949, p. 211.
[5] A. M. Samarin and A. U. Poliakov, "The Deoxidizing Powers of Vanadium," Bulletin of the Academy of Sciences of the USSR; Section of Technical Sciences, No. 1, January 1949, p. 100.

Hardfacing Sand Muller Plows

THE plow blades in a sand mulling machine, exposed to severe abrasive operations, in many cases will mull a total of more than 125 tons of foundry sand per day. In the case of one muller, the wear was so severe that plows had to be replaced every 4 days on the average. As it takes two men 3½ to 5 hr to remove old plows and replace them with new ones, replacement was an expensive maintenance item.

To get longer service from these parts, hardfacing was tried. As an experiment, Amsco Tube Tungsite, 30 to 40 mesh, was applied. The useful life of the parts was multiplied at least 32 times. After four months of service the original plows are still in place, and it is estimated that they were good for at least two months more—a total of over six months. The Tungsite hardfacing saved the company approximately $390 in castings and labor alone, not to mention loss of production time, during the six-month period.

Amsco Tube Tungsite, the hardfacing rod used on these plows, is of the tungsten carbide type. Finely granulated particles (30 to 40 screen mesh in this case) are encased in a tube of mild steel. In welding, the tube casing melts to form a matrix for the hard carbide particles, creating an extremely wear resistant surface.

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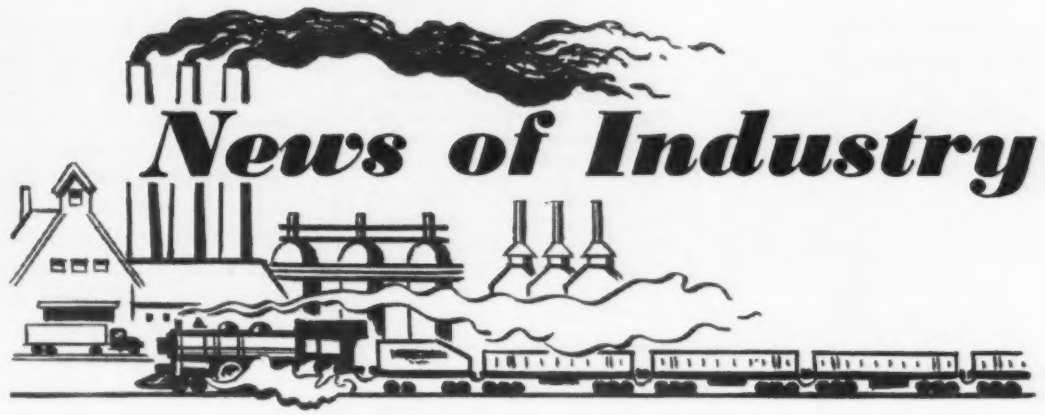


Costs Are Rising

Pittsburgh—Steel labor, materials and services costs are up. The granting of pension and social insurance programs to steel workers has focused attention on cost increases shouldered by steel producers since the last general steel price increase of July 1948. Here are some of them:

LABOR

The pension and insurance programs are expected to cost producers in the neighborhood of $4 per ton of finished steel.

RAW MATERIALS

Commodity	Change
Coal	Up 4 Pct*
Iron Ore	Up 7 Pct*
Nickel	Up 6¼¢ a lb
Pig Iron	Up $3 a gross ton
Chrome	Up $210 a net ton
Cobalt	Up 15¢ a lb
Ferrochrome	Up $45 a net ton
Ferrosilicon	Up $37 a net ton (average)
Ferromanganese (low carbon)	Up $45 a net ton
Ferromanganese (high carbon)	Up $27 a gross ton (average)
Ferrotitanium	Up $100 a net ton
Ferromolybdenum	Up $300 a net ton

Scrap prices are still below the July 1948 composite of $41.33 a ton, but began moving up fast after the Bethlehem settlement. Latest composite price is shown on p. 148.

SERVICES

Freight rates were increased 4 pct Sept. 1, 1949 on top of a 6 pct boost Jan. 1.

*According to industry testimony before the steel fact-finding board. Further testimony estimated these two items accounted for more than 60 pct of the industry's raw materials costs in 1948.

Pension Pacts to Put Pressure on Prices

Raw materials and services are higher . . . Most steel firms report lower profits . . . General steel price boost unlikely until labor costs are known.—*By JOHN B. DELANEY.*

Pittsburgh — Will rising labor and raw materials and services costs force a general increase in steel selling prices?

Probably not this year. The biggest items of cost, the pension and social insurance concessions won by the CIO United Steelworkers of America, do not for the most part become effective until Jan. 1, 1950, or later.

But when these increased costs begin to make themselves felt, and should the current heavy demand continue into next year, as expected, it will be difficult for producers — particularly the smaller ones—to hold the line, as a matter of self-preservation, while the opportunity presents itself.

Trend Already Seen

Some consumers already are paying more for steel. Conversion deals are back, and this increases the cost to the customer by about 50 pct over mill costs. Proof that desperate metalworking plants are willing to pay premium prices is the fact that the Whitney-Apollo Steel Co., a high-cost producer, is back in business again with an announced 3-month backlog of sheet orders.

At least two companies announced price increases after signing with the union. Central Iron & Steel Co. increased plate prices $5 a ton, and John A. Roebling's Sons Co. boosted the price on some wire and strip. These may indicate the trend for smaller companies, at least while demand remains tight.

Here are some points to consider:

1. Pre-strike earnings declines: Even before the strike steel company earnings had dipped sharply from last year, due largely to the spring slump and the slow comeback. Third quarter reports of 25 producers show that earnings of 22 companies were off, and six of these reported losses.

In this group, only U. S. Steel,

Turn to Page 114

Completes New Pipeline

Chicago — The Texas Empire Pipeline Co. of Tulsa, Okla., has just completed a pipeline into the Chicago area which increases the daily capacity for crude oil piped into this area by 73,000 bbl. The pipeline terminates at Rockford, Ill. where the company has established a major tank farm.

U. S. Steel and Union Agree; Steel Industry 95 Pct Signed

Pittsburgh—Signing of the U. S. Steel-United Steelworkers pact on Armistice Day, Nov. 11, followed over the weekend by Wheeling, brought over 95 pct of the steel industry back into production.

The U. S. Steel agreement, as president Benjamin F. Fairless noted, follows closely the previously negotiated contracts with other companies. A special stockholder's meeting will be called to pass upon the pact. Like others, it runs for 5 years on pensions and insurance, with the corporation given the right to cancel the pension plan after 2 years.

To newsmen at the press conference announcing the agreement, the attitude of union president Phil Murray seemed to have changed somewhat from the stiff stand he has maintained since June. He announced a desire to work in harmony with management and apparently buried the hatchet he had kept so sharp for the last 5 months.

Great Lakes Signs, Too

Detroit—The 40-day strike involving more than 10,000 workers at Great Lakes Steel Corp. ended here Nov. 10 with the signing of an agreement covering pensions and insurance for hourly rated employed patterned closely after the Bethlehem agreement.

Union sources estimated the company contribution to the pension fund will be approximately 9¢ per hr.

Under the new insurance plan the company will contribute 2½¢ per hr. The worker will put 1.8¢ per hr into the fund, according to Thomas Shane, the union's regional director.

An Opposite View

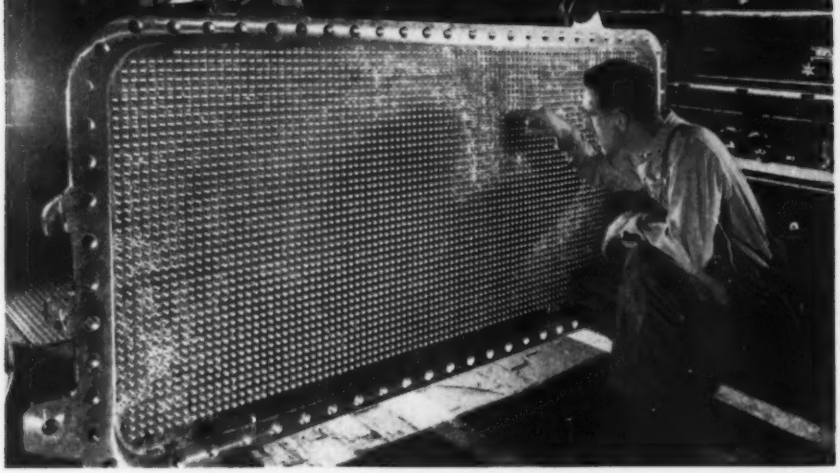
New York—The impact of the current heavy importation of Swedish iron powder on the domestic iron powder industry was discussed in The Iron Age, Nov. 3, p. 111. Ekstrand & Tholand, importing agent for the Hoeganaes-Billesholms Co., presents an opposite view in the Dear Editor column of this issue, p. 180—Ed.

ECA Plans New Buyers Guide

Washington—The Economic Cooperation Administration has announced that it is bringing out a directory for use of overseas buyers in placing Marshall Plan orders for American products.

It will list the names and products of small business firms.

HOW MANY HOLES: The count shows that 4300 tube holes have drilled, reamed, and serrated in this type 304 stainless steel tube sheet for a regenerator to be used with a gas turbine being built by Allis-Chalmers.



Pension Pacts

Continued from Page 113

Bethlehem and Keystone Steel showed increases. For the first 9 months of the year, 18 firms reported declines from the same period of 1948, with two winding up in the red. The smaller producers, along with the alloy-specialty steel companies, were hardest hit.

2. Cost of the pension and social insurance programs:

Irving S. Olds, chairman of U. S. Steel Corp., estimated that his company's original offer, based on the steel industry fact finding board's 10¢ per hr "package," represented an increase in cost of $3 for each ton of finished steel produced by the corporation. Estimates of the cost of the Bethlehem "pattern" vary, but are generally higher than 10¢ perhaps as much as 15¢ for companies with no current pension and social insurance programs. On this basis, the average cost increase per ton might be around $4. In addition, initial cost of a pension program is high.

3. Strike losses:

Conservatively, the strike probably cost steel companies 10 million tons of production. Translated into sales volume, this represents $800 million. Assuming that 6 pct would be a fair return, the cost in net earnings would approach $50 million. But lost production and sales are only part of the picture. Some others include cost of maintaining idle plants, damage to equipment, demurrage on railroad cars that could not be unloaded, and maintenance of the non-striking salaried payroll.

4. Higher raw materials costs since the last general steel price increases in July, 1948:

For example, Dr. Jules Backman testified before the fact-finding board that coal and iron ore increased in price 4 pct and 7 pct, respectively, since Jan., 1949. Republic Steel Corp. told the board increases in material costs averaged 7 pct. Coal will go up again if Lewis wins more for his miners. (For other raw materials and services price increases see table, p. 113.)

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Armco's East Works Set All-Time Record Last Month

Middletown, Ohio—East Works of Armco Steel Corp. set a new all-time high record for steel production last month, according to L. F. Reinartz, assistant vice-president.

The record, approximately 1000 tons higher than the previous peak, was made possible by the combined output of the electric melting department's biggest monthly tonnage to date and a near-peak output by the openhearth department, Mr. Reinartz said. He said that the contribution of the electric melting department is all the more remarkable because no hot metal is used in those furnaces, the charge consisting almost entirely of scrap.

Releases Renegotiation Forms

Washington—Government Printing Office in Washington is getting ready to release copies of military renegotiation regulations as one unit. Future changes will be supplied subscribers free of charge by GPO. Regulations are being printed on stock punched for three-ring binders.

Belgium Making More Looms

Washington—Belgian output of textile looms for export to European and other countries has been stepped up from 25 to 150 a month with the aid of Marshall Plan equipment and the "drawing rights" system of ECA.

In addition to supplying looms for France, Holland and the Belgian Congo, the Picanol plant currently is filling orders for Greece and the United Kingdom.

National Lead Reports

New York—Earnings of National Lead Co. for the first nine months of 1949 are reported as $10,799,881 by Joseph A. Martino, president. This amounts to $2.82 per share on the common stock after preferred dividends.

Lukens Renews Production

Coatesville, Pa.—Rolling operations on the 120-in. plate mill at Lukens Steel Co. were resumed on Friday, Nov. 11. This was followed by the 206-in. mill on Nov. 14.

The first openhearth tapping, since the strike closed the plant on Oct. 1, took place Wednesday night, Nov. 9. Lukens is operating 9 of its 10 furnaces this week.

Matson Sells Subsidiary

San Francisco—United Engineering Co., a subsidiary of Matson Navigation Co., has been sold to Mel and Ellis Jacobs, Philip Sussman and Louie Dulien. Reason for the disposal of the property was said to be that repairs of Matson ships are now being made by shipyards in the San Francisco Bay area on a bid basis.

French Gray Iron Founders Plan to Use Some U. S. Methods

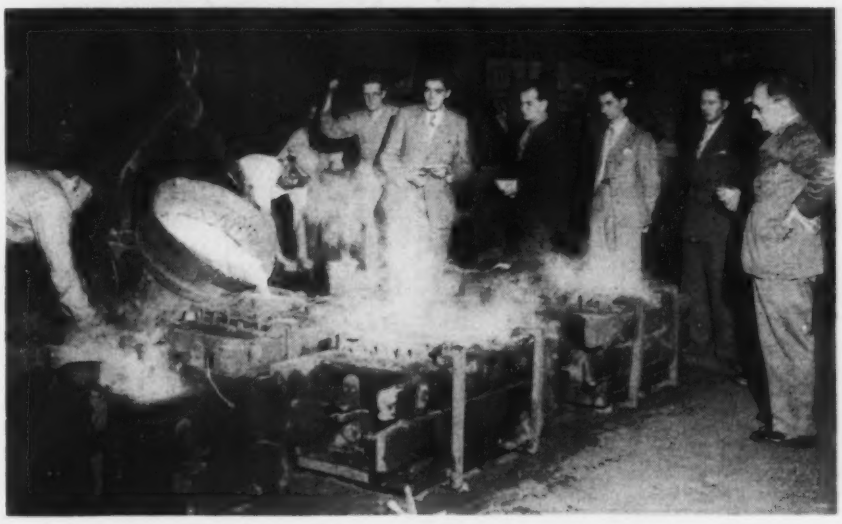
New York—Seventeen representatives of the French gray iron foundry industry completed a 6-week study of American foundry methods last week. The group, under the sponsorship of the Economic Cooperation Administration, visited foundries in Illinois, Wisconsin, Michigan, Ohio and Pennsylvania.

The group had always visualized improvements in French foundry techniques, and now after visiting American plants are sure that changes can be made in their shops. The French foundry industry has had little new equipment since 1939, and equipment that was old at the beginning of the war is now obsolete. French interest rates, 7 to 8 pct or more, and lack of currency stabilization has hindered the buying of this needed equipment.

American productivity per man is about twice that of the French foundry worker. Specialization and mechanization has brought about this greater productivity in the U. S. Mechanization has been applied to the French automotive and textile industry, and is comparable to ours. The main problem of the French is to use more material handling equipment, and thereby increase productivity.

Plans have been formulated by the French group to increase their country's foundry productivity. Suppliers will be educated so that better quality raw materials will be available. Customer's designs will be simplified with the idea of cutting costs. Foundries will practice quality control, and introduce time and motion studies, resulting in the elimination of rejected castings and increased productivity.

FRENCH FOUNDRY TEAM: Members of the French gray iron foundry group, who visited the U. S. under the technical assistance program of the ECA, watch a pouring operation at the T. L. Artz Foundry Co., Chicago. The French delegation spent 6 weeks here studing metal control, cost control, foreman and apprentice training, plant layout, and materials handling.



INDUSTRIAL SHORTS

CHANGES NAME — The Permanente Metals Corp., Oakland, Calif., has announced a change in its corporate name to KAISER ALUMINUM & CHEMICAL CORP. The corporation's wholly owned sales subsidiary, Permanente Products Co., will be renamed Kaiser Aluminum & Chemical Sales, Inc.

EXPANDING—It has been announced by the Hyatt Bearings Div., GENERAL MOTORS CORP., Harrison, N. J., that work has commenced on a 125,000 sq ft extension to their second plant in nearby Clark Township.

JOIN NOW—A special 1 week course in porcelain enamel spray finishing is being offered by BINKS MFG. CO., Chicago, beginning Feb. 6. Classes will be conducted without charge and applications should be mailed to E. F. Watts, 3122 Carroll Ave., Chicago 12.

NEWSLETTER — A management's newsletter called "CIO Steel Worker Trends" has been started by the INDUSTRIAL RELATIONS SERVICE BUREAU of Chicago. The four page publication comes out fortnightly and reports on labor developments within the jurisdiction of CIO United Steel Workers of America.

MERGER — Dor - O - Matic Co., Chicago, has been merged into the LOGAN ENGINEERING CO. The manufacture of the Dor-O-Matic door control has been transferred to the Logan plant in Chicago.

PEI OFFICERS — F. L. Meacham, Chicago Vitreous Enamel Product Co., has been elected president of the PORCELAIN ENAMEL INSTITUTE. Other officers elected were W. A. Barrows, Herbert R. Spencer, J. T. Penton, J. H. E. McMillan, R. A. Dadisman and T. G. Harris, vice-presidents.

EASTERN MARKET—The York, Pa., plant of the Owens Yacht Co. has been purchased by LYON METAL PRODUCTS, INC., Aurora, Ill., manufacturer of steel products. Operations will start some time during the first half of 1950.

SCRAP DEALER — Announcement has been made of the formation of the ASSOCIATED IRON & METAL CORP. in Youngstown to process light black sheet, new sheet clips, shearing and heavy burning scrap, turnings and specialties. A. Mayo Levick will be president; M. W. Stadtlander, vice-president; and Maurice Kline, secretary and treasurer.

NEW MANAGEMENT — The assets of the O. K. Tool Co., Shelton, Conn., manufacturers of milling cutters, have been acquired by WILLIAMS & HUSSEY MACHINE CO., Wilton, N. H., manufacturers of special machinery and gages.

CANADIAN SERVICE—De Laval Steam Turbine Co., Trenton, N. J., has appointed the SUPERHEATER CO., LTD., of Montreal, in conjunction with its affiliate, Combustion Engineering Corp., Ltd., to sell and service their turbines, pumps, gears and compressors.

MIDWESTERN AGENT — The Butterfield Div. of Union Twist Drill Co., Derby Line, Vt., manufacturer of taps, dies, reamers and special metal cutting tools, has appointed SMINKEY & HASS, Chicago, as a distributer.

MORE ROOM—New and enlarged offices in Chicago have been opened by the LAPOINTE MACHINE TOOL CO., Hudson, Mass., to serve as regional headquarters. James W. Dopp, George A. Hodges, Jr., and Richard S. Davis have been appointed as sales and service engineers for this area.

Filing of Non-Communist Affidavits Shows a 5 Pct Rise

Washington—Led by locals of the United Steelworkers, CIO union officials and locals have been filing non-Communist affidavits in increasing numbers over the past month.

National Labor Relations Board records show that as of Nov. 1, there were 192 national unions, 10,436 locals and 98,087 officials in full compliance with the affidavit and financial report provisions of the labor act.

The number of officials in compliance increased by 4553 during October, a 5 pct rise over the total as of September.

ECA Approves British Project

Washington—Economic Cooperation Administration procurement authorizations have been approved for $393,000 worth of construction and mining machinery and $192,000 worth of metalworking machinery for the United Kingdom. All are for use in connection with the Stewart & Lloyds Co., Ltd., steel project.

French procurement of $1.7 billion in mining and construction machinery, $430,000 in metalworking machinery, and $262,000 in machine tools has also been approved. The machine tools are for delivery in 1952.

Retail Inventories Increase

Washington—Paced by a $50 million increase in motor vehicle dealer stocks, September book values of retail inventories continued to rise for the third consecutive month.

September inventory rises of $150 million were centered in the wholesale and retail businesses following an earlier clean-up of stocks. This was reflected by a drop of a half-billion in manufacturers' inventories.

Totals at the beginning of October were: Manufacturing, $31.2 billion; retail, $14.4 billion; and wholesale, $9.2 billion.

Runaway Scrap Market Not Expected Now

Mill inventories put them in position to resist fantastic prices though conversion deal looms as possible threat . . . Strike put dealers back in business.—*By D. I. BROWN.*

Chicago—A runaway steelmaking scrap market is not expected now despite the fact that prices are strong and the conversion steel deal is back again. Steel company inventories put mills in a good position to resist fantastic prices but it is admitted that the scrap market has not been "normal" for most of this year.

Speculation Has Been Rampant

Fluctuation in prices have been wide and speculation has been rampant in both long and short directions. Mill buying habits have varied considerably and dealers have been saddled with many new and peculiar troubles.

In January prices were at the highwater mark established by the "circus" runaway market of the previous year. In a few months the $42.00 a ton No. 1 heavy melting market was below $30.00 and a low of $20.00 was reached by the end of June. During this decline dealers suffered as the mills in this period restricted much of their buying to "industrial" or earmarked purchases. The mills during 1948 had established the earmarked buying method as a matter of protection and its momentum carried such methods through the first half of this year.

Better Business Firmed Market

During the decline the extensive gathering system built at the yard level began to disintegrate. The truckers hauling into yards decreased from 50 to 75 pct in number. They couldn't make a decent profit at the prices the dealers were able to offer. In July help in the yards was cut back by many dealers. They sold little tonnage, but at the same time they built very little inventory. The market reflected the general uncertainty of first and second quarter business.

However, by Aug. 1 the market had strengthened. Business confidence returned and prices started upward for three major reasons: (1) The $20.00 price was much too low and had been artificially depressed; (2) the brokers turned bullish; and (3) the mills started to buy again in the free market in fair tonnages.

Seldom can anyone buy any free commodity at the bottom of the market. The minute they try, the market jumps upward. During August, September and October, this climb was steady. Speculative buying by brokers was intense. They expected even higher prices.

Strike Helped Scrap Dealers

The mills to a limited extent returned again to the old practice of accepting dealer tonnages. During this time dealers hesitated to sell. Nobody wanted to be caught short on a tonnage. By Oct. 1 the price of No. 1 heavy melting in Chicago had reached $29.00 and higher prices were expected.

During the 6 to 7-week steel strike prices fell suddenly to $26.00 and then after the Bethlehem settlement jumped back to $31.00 a ton. Hence the strike merely momentarily interrupted the general upward price trend. The tone of the market did not slacken. In fact, it strengthened because winter was near at hand and steel operating rates, it appeared, would return to capacity and stay there for at least 3 to 4 months.

The strike put the dealers back in the scrap business. They have yards full of scrap. Much of this tonnage they accepted because they had to, although much of it was bought and laid down either by them, the brokers or the mills because all expected higher prices later this year.

Today the market is still strong. No runaway prices are expected yet. The mills have good inventories and can resist higher prices. One thing looms as a threat. Much of the strength of last year's record prices came from the conversion steel market. The strike has revived this market. If conversion increases and steel is in short supply for very long, the scrap market again will feel the effects of ingot makers buying premium scrap for their operations. Conversion was the major prop to the high scrap prices in 1948. It could repeat its role in December of this year and continue through the first quarter of next.

"They're charging the openhearth."

Blaw-Knox Wins Contract

Pittsburgh—The Chemical Plants Div. of Blaw-Knox Co. has been awarded the contract for design and construction of a liquid resin plant at Calumet City, Ill., for the Catalin Corp. of America. The plant is scheduled to begin production next March.

Awarded Cartridge Case Contract

Washington—The Army Dept. has awarded a contract for 200,000 57mm cartridge cases to the Norris Stamping & Mfg. Co., of Vernon, Calif. The contract price was $439,000.

Economic Necessity Seen Forcing More Machine Tool Sales

NMTBA president tells members a revival of business is certain.

White Sulphur Springs, W. Va. —Sheer economic necessity will dictate an upturn in machine tool sales, L. D. McDonald, president, National Machine Tool Builders Assn., told NMTBA members at their 48th annual meeting here.

Mr. McDonald, who is vice-president of Warner & Swasey Co., Cleveland, charged that union restrictions on production are levying a bill of millions of dollars upon the American public.

His report highlighted the first session of the 3-day meeting of representatives of 172 machine tool manufacturers of the U. S.

Output Being Held Down

He said machine tool operators, under leadership of union stewards, are holding down the output of new machines to a mere fraction of the productivity that has been built into them.

According to Mr. McDonald, the result of such limitations on output is that the general public is not getting the benefit of the advances in machine tool design.

He pointed out that sooner or later the union men who are preaching the philosophy of fear of the new machine will realize they are defeating their own objectives, for limitations on productivity lead either to inflation or unemployment.

Cites Purchase Barriers

He said the metalworking plants of the country are still chiefly equipped with machine tools of war vintage designs which were frozen in 1940, and cited three barriers to the purchase of modern and far more productive machines:

(1) Section 102 of the Internal Revenue Code, which makes a company hesitate to build up reserves for equipment replacement for fear it may suffer a tax penalty upon the charge of improper accumulation of surplus.

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Replacement Funds Inadequate

Mr. McDonald declared that it is impossible for a company to gain out of depreciation allowances the funds sufficient for replacement.

Part of this is due to inflation, but it would be true if there were no inflation, he added. The facts show in our industry that on the average, owing to our rate of improvement, a machine tool model is rendered obsolete within about 7 years after its introduction.

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Failure to Fill Steel Orders Brings Legal Action

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The action was against Apollo Industries, Inc., and the Phoenix-Apollo Steel Corp. The present operator of the mill is not involved.

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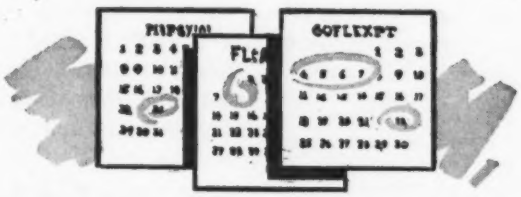

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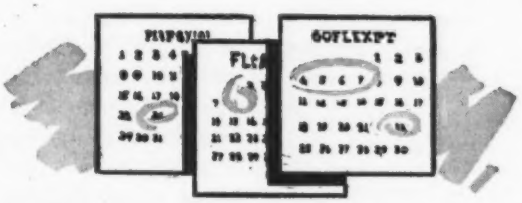

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Metallurgy Is Highest Paid Of the Engineering Professions

ASM survey gives insight into the effect of education and experience.

Cleveland — Metallurgy is the highest paid of the engineering professions, according to a recent national survey conducted by American Society for Metals from its headquarters here.

The survey, said to be first of its kind ever made, also classified the professional metallurgist as to his title, class of work, responsibility over others, distribution of time, products made by his company, as well as salary bracket at different periods of employment.

Other results of the survey are:

The average income for metallurgists, according to the ASM, is $6567. The national average income for all types of engineering, according to U. S. Bureau of Labor Statistics, is $4668. Comparisons with other professional incomes show: The lawyer receives an average of $5719; the chemical engineer $4320 average. The average yearly income of all college graduates in the U. S. is $4689, while the average yearly pay of all U. S. workers is $2840.

Three Factors Explained

Three factors were shown to affect a metallurgist's income—his responsibility, his college or technical training, and the length of time on the job.

Aside from 6.5 pct of those queried who had succeeded to administrative and sales positions, the responsibility of metallurgical control over quality and production offered the highest income—a high of $35,000, with an average of $7221.

The second factor, technical training, shows that with a bachelor degree, the metallurgist's income averaged $6601. A master's degree justified $6877. The metallurgist with a doctor's degree has an average yearly income of $9122.

The third influence came from experience or length of service. Metallurgists with one year out of college drew an average income of $3700. After five years on the job, the average went to $5500. Ten years' experience advanced the income to an average of around $6500. Twenty years after graduation, the metallurgist was averaging $8100. The peak average income is reached 30 years after receiving a college degree, $9000. From this point the average income gradually decreases.

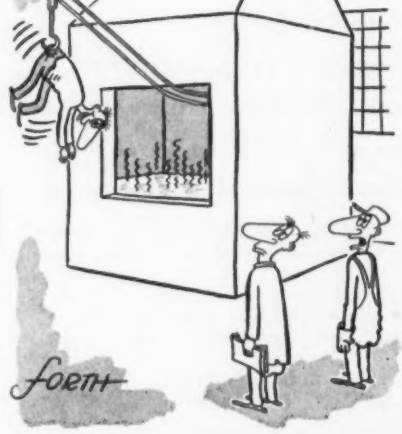
Job Responsibilities Listed

Of those responding, 32 pct were employed by the producers of basic metals; 51 pct were in industries which fabricate metals into finished products or parts. The remainder were engaged in various services to the industry.

Of those queried, 40 pct were concerned with technical problems of production; 32 pct were engaged in technical research or development and the remaining 28 pct were concerned chiefly with technical contacts, management and distribution.

A majority of those questioned —61 pct—gave their titles as metallurgists. Of this number 11 pct were identified as Chief metallurgists; 7 pct of the replies came from Material engineers, while 4 pct were Production engineers. Supervisors, superintendents, foremen and other operating personnel made up the balance.

Only in technical duties did any of the respondents devote all of their time. Thirty-one pct of the total number spent 100 pct of their time on technical matters. All of those questioned spent some of their time in this field. Only a single reply indicated less than 11 pct time in this activity.



"I'm afraid sir, that Jenkins is a bit pickled."

Purchases Magnet Cove Barium

Cleveland—A proposal by Dresser Industries, Inc., to purchase the common stock of the Magnet Cove Barium Corp., Houston, for approximately $2,800,000 in cash plus about 17,500 shares of Dresser common stock has been accepted by the majority stockholders of Magnet Cove, according to H. N. Mallon, president of Dresser Industries.

Magnet Cove's major products consist of mineral and chemical compounds used in the preparation of drilling "mud." In rotary drilling, "mud" fluid is forced down through the drill pipe and up again between the pipe and the well wall, to cool the drill bit, to remove cuttings, and to control the high formation pressures encountered in drilling.

Budd Ships Cars to Brazil

Philadelphia — The second of three shipments of all-stainless steel railroad passenger cars, built by The Budd Company for Central Railway of Brazil sailed on the Norwegian freighter, S.S. Christian Smith for Rio de Janeiro on Nov. 14. There were 24 cars in the cargo.

The new cars are similar to those Budd has built for the crack streamliners of the United States railroads. They are equipped with the latest air conditioning and fluorescent lighting systems and have modern interior decorations. They will be placed in service immediately upon arrival in Brazil and will run between Rio de Janeiro, Sao Paulo and Belo Horizonte.

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Auto Executives See Hectic Operations

Confusion caused by the steel strike may exceed that of postwar period . . . Many unanswered questions still facing those making decisions—*By WALTER G. PATTON*

Detroit—Many auto executives feel that as a result of the steel strike the industry may be entering a period of confusion and uncertainty that will exceed even the hectic operations immediately following the war.

"Settling the steel strike won't help as much as most people think," one auto executive told THE IRON AGE. "Even if our own steel demands are met, we can never tell when a prominent parts supplier will be pulled down." Failure to obtain steel may result either because the mill is still out of production or because it is slow coming back to full output at the present time.

Hectic Conversion Predicted

It has been predicted here that the auto industry may soon find itself engaged in its most hectic round of conversion steel activity.

This added expense, together with rising costs resulting from pensions, have undoubtedly knocked out for the moment any possibilities for a cut in car prices as set by manufacturers. If auto price cuts come, they will undoubtedly have to come from increased dealer discounts.

Several Questions Unanswered

Here are some unanswered questions Detroit steel buyers are wrestling with at the moment:

(1) To what extent will lack of maintenance in some struck mills delay steel production and affect the quality of steel?

(2) To what extent will ingot molds be available for conversion?

(3) How many tons of conversion steel can be worked in ahead of and in conjunction with regular mill production? Most steel mills, it is pointed out, have better balanced equipment than they had a year or two ago.

(4) Will there be concurrent high demands for steel from the truck, appliance and construction industries? Each of these industries has been extremely active in recent weeks. This is in sharp contrast to the lull prevailing last summer.

Production Still Hampered

Earlier, it was hoped that announcements of plant shutdowns resulting from the steel strike would be rescinded. Favorable strike developments during the past week have helped but they did not come quickly enough to stem the tide. Ford, with its own steel mill and close relations with Bethlehem, was able to extend its period of operation indefinitely. The big question mark is General Motors, which is heavily supplied by U. S. Steel.

One GM division, Pontiac, has announced a shutdown for an indefinite period on Nov. 23. Model

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Will Visit British Labs

Chicago—Dr. John E. Barkley, supervisor of physical chemistry research at Armour Research Foundation of Illinois Institute of Technology, has gone to London, England, for a 2-week consultation with British scientists on the latest developments in infrared photocell research.

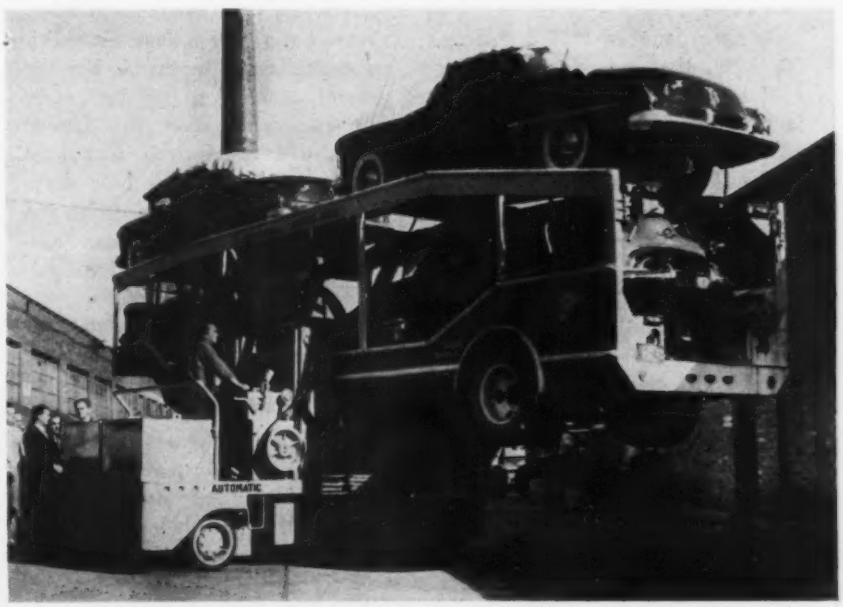
Mr. Barkley will visit several laboratories in England and participate in field tests.

Westinghouse Gets Contract

Pittsburgh—Westinghouse Electric Corp. has been awarded a $1,300,000 contract for 14 elevators and signal-control system for installation in the 30-story office building to be erected here next year by Aluminum Co. of America.

Eight of the elevators will be capable of a speed of 1000 fpm, while six will have a top speed of 800 fpm.

INDUSTRIAL GIANT: Demonstration showing the lifting capacity of one of the world's largest industrial trucks, built by Automatic Transportation Co., Chicago. The trailer truck and four automobiles lifted only weigh 15 tons compared with the truck's ability to actually handle loads up to 110,000 pounds. From a starting position 26 in. off the ground, the load can be lifted to a height of 60 in.



Viewing the News from

The ECONOMIC SIDE

By JOSEPH STAGG LAWRENCE

"A Short Sale"

AN odd development is taking place in gold. The persistent flow of gold to these shores has been reversed. Substantial amounts are being earmarked for the account of foreign governments.

It is an axiom among shrewd international bankers that the currency of a country under a labor government is a short sale. The reasoning, amply supported by the record, is that such a government does not have the fiscal integrity to keep within the bounds of its budget; that it will spend lavishly to achieve social objectives; that it will resort to any expedients, however questionable, to avoid deflation. By any fair test, the American government fits the definition. It has been a labor government for 16 years.

If the American dollar has not been a short sale during this period, it has been due to wholly-exceptional circumstances. In the first place, this country has been running a substantial, continuous export surplus. Figures just released covering the period 1914-1948 show a "favorable" trade balance for the period of $101 billion, of which $68 billion has been in the form of lend-lease, gifts, or sour credits.

Between January 1934 and Sept. 18, 1949, the American price for gold has been a magnet attracting fantastic amounts of the metal. The $35 which an ounce of gold brought at the U. S. Treasury bought more goods here than it could have commanded almost anywhere else on earth.

Finally, the International Monetary Fund committed its members to maintain a fixed price for gold at $35, thereby closing the open markets of the world to the principal gold producers. As a result of all this, the U. S. Treasury accumulated the greatest gold hoard in history, accounting, at the end of the summer, for approximately 70 pct of the world's monetary gold stocks.

It should be noted here that the Gold Reserve Act of 1934 prohibits the ownership of gold coins or bullion by an American citizen. It states categorically that "no currency of the United States shall be redeemed in gold." The classic refuge from paper money debasement which gold, in the past, has always vouchsafed the individual is specifically denied the American. It is a right enjoyed freely in less enlightened areas of the world—by the Chinese coolie, the Indian untouchable, the Mexican peon, and the French peasant.

The right which the law so emphatically denies the American is specifically accorded in the statute to all foreign governments and central banks. The anticipation of inflation and the hoarding of gold which our own officials hypocritically deplore as "contrary to public policy," when practiced by private Americans, is entirely proper when practiced by governments.

The echoes of Sir Stafford's announcement had barely died out before the Italian Minister of the Treasury proudly announced to his Parliament that he had bought 116.6 tons of gold. With Marshall Plan dollars. This was smart speculation, a move out of which domestic political capital could be made. For the general assumption, fed by persistent rumors, is that the United States will devalue so that gold bought today for $35 will be worth more tomorrow. Belgium, Cuba and several other Latin-American governments are reported to have followed the Italian example.

In actions more eloquent than words, foreign governments — the only parties in the premises free to express their judgments—are saying that the American dollar is a short sale; that our government will continue to tamper with its value, that it will be worth less tomorrow than it is today.

French Group Will Study Our Machine Tool Industry

Washington—Louis Champetier, director of a French machine tool experiment station, will head a group of representatives of the industry that is scheduled to begin a 6-week study of American manufacturing Nov. 16.

The first 3 weeks will be given over to visiting tool factories and holding seminars. The remainder will be taken up with visits to industrial plants where machine tools are in operation.

There will be 21 persons in the group, including the chief engineer of Sculfort, Fockeday, Vautier & Co. Seventeen of the visitors will represent the three French trade unions.

Strikes Boost Unemployment

Washington—Secondary unemployment as a result of the coal and steel strikes rose at an average rate of at least 80,000 a week during October.

This is the minimum estimate by officials of unemployment compensation offices which reported that new claims reached a high of more than 330,000 for the final week in October. No estimate was made for persons laid off but were not eligible for pay.

Auto Operations Hectic

Continued from Page 121

changes have nothing to do with this interruption in Pontiac's output. The company changed over to 1950 models this week. Chevrolet is operating on a 4-day week and expects to continue for several more weeks. Both Cadillac and Buick are due for extensive model changes but are expected to continue in production through November.

The recent back-to-work movement in the steel industry has not halted a Willys Overland shutdown although favorable developments on the strike front will undoubtedly make possible an earlier reopening of the plant than would have been possible otherwise.

Resume Your Reading on Page 121

UNIVERSITY OF MICHIGAN LIBRARIES

Construction Steel Awards

Fabricated steel awards this week included the following:

380 Tons, Kane County, Wis., state highway bridge section F1-05-1-19 through L. G. Arnold, Inc., Eau Claire, Wis., to Bethlehem Steel Co., Bethlehem.

290 Tons, Chicago, Wacker Drive extension from Randolph to Washington Sts. section 1212-2 through Hurlihy Midcontinent Co., Chicago, to Bethlehem Steel Co., Bethlehem.

130 Tons, Bronx, N. Y., St. Joseph's Annex to Sacred Heart Parochial School to Grand Iron Works, New York.

Fabricated steel inquiries this week included the following:

2617 Tons, Hudson, Wis., bridge over the St. Croix River.

720 Tons, Menasha, Wis., Racine St. bridge.

295 Tons, Jonestown, Pa., bridge over Little Swatara Creek, Pennsylvania Department of Highways. Bids to Dec. 2, 1949.

100 Tons, Newark, N. J., new building for M and M Transportation Co. of Boston. Fritz Construction Co., Roxbury, Mass., contractor.

Reinforcing bar awards this week included the following:

335 Tons, Lake County, Ind., state highway bridge section 3139, Arco Midwest Corp., Chicago, low bidder.

225 Tons, Marshalltown, Iowa, Central St. overhead bridge to Pittsburgh Des Moines Steel Co., Pittsburgh.

160 Tons, Chicago, Washington Park YMCA building to J. T. Ryerson and Son, Chicago.

110 Tons, Jay County, Ind., state highway bridge section 3135 J, Deniston and Garber Co., Rochester, Ind., low bidder.

Reinforcing bar inquiries this week included the following:

680 Tons, Milwaukee, building for R. A. Johnson Mfg. Co.

600 Tons, Yuma, Ariz., canal lining and structures, Wellton-Mohawk Canal, Bureau of Reclamation, Yuma, Spec. 2822, bids to Dec. 6.

215 Tons, Dexter, Ore., highway and railroad relocation, Portland District, Corps of Engineers, Ser. No. CIVENG-35-026-50-153, bids to Dec. 22.

170 Tons, Harvard and Littleton, Mass., state highway construction project, Fred D. Sabin, Cambridge, Mass., engineer. Completion date Nov. 1, 1950.

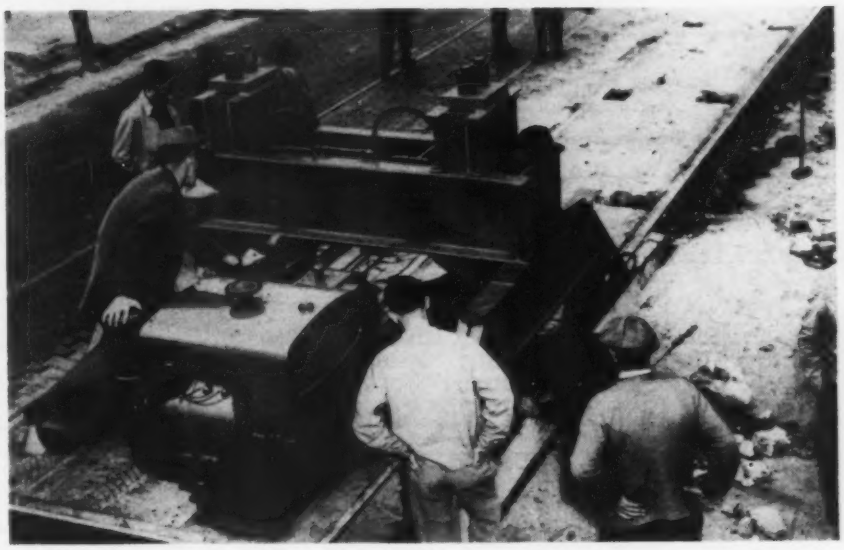
100 Tons, Portsmouth and Newington, N. H., reinforced concrete frame bridge, David Nassif Co., Boston, low bidder. Completion date June 1, 1950.

Railroad car inquiries this week included the following:

The Southern Pacific is inquiring for 5100 freight cars which include 2500 box cars, 1500 hoppers, 700 stock, 300 flat and 100 passenger cars. The New York Central R.R. on Nov. 7 opened bids for the 1950 rails requirements which include 3000 to 4000 tons for the P. and L.E. R.R. and 75,000 tons for the N.Y.C. The New York Central R.R. is inquiring for 500 refrigerator cars which will probably be built at the Despatch Shops at Rochester, N. Y.

Changes Made in Export Control

Washington — Export destination controls have been placed on an additional 60 commodity classifications, bringing to about 170 the total such listings since the last week of October.



RIPPER: A special track pulling machine has just been put in service by the Chicago Transit Authority. This machine, built by Rodgers Hydraulic Corp., Minneapolis, will pull 1000 ft of rail per day. The whole track section, paving and all, is lifted and the machine exerts a maximum pressure of 500,000 lb. This load is distributed over two 15-ft skids, one on each side of the track puller. Transit officials told IRON AGE they have not had to use the full lifting capacity of the machine to pull any track encountered so far.

States Functions of Steel Mill Organizing Committee

Boston—Appointment of Joseph B. Ely, former governor of Massachusetts, as legal counsel for the New England steel mill organizing corporation was announced here early this week by Frederick S. Blackall, Jr., chairman of the New England Council's Steel Committee.

The new corporation will have a board of directors composed largely of New Englanders, Mr. Blackall said, "and its chief executive will be provided by the steel company selected to join with New England in establishing the enterprise.

More Tariff Cuts Expected

Washington — Under authority of the recently extended Trade Agreements Act, the White House and State Dept. are making arrangements for a third round of tariff slashes in a move to reduce dollar shortages of other nations.

Arrangements are already under way by the State Dept. for a conference to be held next September at a site to be decided early next year. In attendance will be the 32 nations which are already parties to the general agreement negotiated at Geneva in 1947 and at Annecy in 1949.

Fred Bannister Dies Suddenly

New York—Pearson Frederick Bannister, eastern regional business manager of THE IRON AGE, died suddenly last Saturday at his home in West Hartford, Conn. He was 42. Death was caused by a heart attack.

Fred joined THE IRON AGE staff Feb. 1, 1946, as assistant regional business manager covering New England. He was formerly advertising manager of the Fafnir Bearing Co., New Britain, Conn. He was a graduate of Choate School.

Fred's sudden passing came as a shock to his coworkers, as well as his host of friends in industrial circles. He is survived by his wife.

Completes Furnace Installation

Pittsburgh—Rust Furnace Co. has completed installation of an annealing furnace to serve the Alabama Pipe Co.'s new plant for the manufacture of centrifugally cast iron water pipe.

The furnace has a capacity of 100 tons of pipe in 8 hr.

AMERICAN IRON AND STEEL INSTITUTE

Production of Open Hearth, Bessemer and Electric Steel Ingots and Steel for Castings

YEAR 1949

(Preliminary)

Period	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL		Calculated weekly production (Net tons)	Number of weeks in month
	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity		
January	7,287,683	101.1	408,552	92.6	487,260	93.8	8,183,495	100.2	1,847,290	4.43
February	6,633,779	102.0	379,698	95.3	467,247	99.6	7,480,724	101.4	1,870,181	4.00
March	7,473,901	103.7	430,176	97.5	483,850	93.2	8,387,927	102.7	1,893,437	4.43
1st Quarter	*21,395,363*	*102.3*	*1,218,426*	*95.2*	*1,438,357*	*95.4*	*24,052,146*	*101.5*	*1,870,307*	*12.86*
April	7,015,611	100.5	404,095	94.6	365,570	72.7	7,785,276	98.4	1,814,750	4.29
May	6,889,230	95.6	400,741	90.9	299,751	57.7	7,589,722	92.9	1,713,256	4.43
June	5,954,619	85.3	349,196	81.8	194,386	38.6	6,498,201	82.2	1,514,732	4.29
2nd Quarter	*19,859,460*	*93.8*	*1,154,032*	*89.1*	*859,707*	*56.4*	*21,873,199*	*91.2*	*1,681,260*	*13.01*
1st 6 months	*41,254,823*	*98.0*	*2,372,458*	*92.1*	*2,298,064*	*75.8*	*45,925,345*	*96.3*	*1,775,236*	*25.87*
July	5,307,471	73.8	300,236	68.2	171,415	33.1	5,779,122	70.9	1,307,494	4.42
* August	6,101,499	84.7	355,335	80.6	257,910	49.7	6,714,744	82.2	1,515,744	4.43
† September	5,993,951	86.1	350,356	82.2	247,601	49.3	6,591,908	83.5	1,540,165	4.28
† *3rd Quarter*	*17,402,921*	*81.5*	*1,005,927*	*77.0*	*676,926*	*44.0*	*19,085,774*	*78.8*	*1,453,600*	*13.13*
† *9 months*	*58,657,744*	*92.5*	*3,378,385*	*87.0*	*2,974,990*	*65.1*	*65,011,119*	*90.4*	*1,666,952*	*39.00*
† October	809,875	11.2	—	—	106,821	20.6	916,696	11.2	206,929	4.43
November										4.29
December										4.42
4th Quarter										*13.14*
2nd 6 months										*26.27*
Total										*52.14*

Note—The percentages of capacity operated are calculated on weekly capacities of 1,626,717 net tons open hearth, 99,559 net tons Bessemer and 117,240 net tons electric ingots and steel for castings, total 1,843,516 net tons; based on annual capacities as of January 1, 1949 as follows: Open hearth 84,817,040 net tons, Bessemer 5,191,000 net tons, Electric 6,112,890 net tons, total 96,120,930 net tons.

† Preliminary figures, subject to revision.
* Revised.

YEAR 1948

Period	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL		Calculated weekly production (Net tons)	Number of weeks in month
	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity		
January	6,770,831	95.6	343,263	77.5	366,784	80.2	7,480,878	93.7	1,688,686	4.43
February	6,247,491	94.4	340,689	82.3	359,837	84.2	6,948,017	93.1	1,678,265	4.14
March	6,845,777	96.6	363,334	82.0	409,659	89.6	7,618,770	95.4	1,719,813	4.43
1st Quarter	*19,864,099*	*95.5*	*1,047,286*	*80.6*	*1,136,280*	*84.7*	*22,047,665*	*94.1*	*1,695,974*	*13.00*
April	5,640,273	82.2	185,140	43.2	399,074	90.1	6,224,487	80.5	1,450,929	4.29
May	6,801,633	96.0	355,659	80.3	423,350	92.6	7,580,642	94.9	1,711,206	4.43
June	6,484,114	94.5	356,907	83.2	424,228	95.8	7,265,249	94.0	1,693,531	4.29
2nd Quarter	*18,926,020*	*91.0*	*897,706*	*69.0*	*1,246,652*	*92.8*	*21,070,378*	*89.9*	*1,619,552*	*13.01*
1st 6 Months	*38,790,119*	*93.3*	*1,944,992*	*74.8*	*2,382,932*	*88.8*	*43,118,043*	*92.0*	*1,657,749*	*26.01*
July	6,348,611	89.8	325,080	73.6	401,826	88.1	7,075,517	88.8	1,600,796	4.42
August	6,633,443	93.6	371,306	83.8	442,085	96.7	7,446,834	93.3	1,681,001	4.43
September	6,594,499	96.3	387,259	90.5	443,086	100.3	7,424,844	96.2	1,734,777	4.28
3rd Quarter	*19,576,553*	*93.2*	*1,083,645*	*82.6*	*1,286,997*	*95.0*	*21,947,195*	*92.7*	*1,671,530*	*13.13*
9 Months	*58,366,672*	*93.2*	*3,028,637*	*77.4*	*3,669,929*	*90.8*	*65,065,238*	*92.2*	*1,662,372*	*39.14*
October	7,120,753	100.5	409,657	92.5	466,485	102.0	7,996,895	100.1	1,805,168	4.43
November	6,925,043	100.9	411,161	95.9	461,354	104.2	7,797,558	100.8	1,817,613	4.29
December	6,927,689	98.0	393,717	89.1	459,373	100.7	7,780,779	97.7	1,760,357	4.42
4th Quarter	*20,973,485*	*99.8*	*1,214,535*	*92.5*	*1,387,212*	*102.3*	*23,575,232*	*99.5*	*1,794,158*	*13.14*
2nd 6 Months	*40,550,038*	*96.5*	*2,298,180*	*87.5*	*2,674,209*	*98.6*	*45,522,427*	*96.1*	*1,732,867*	*26.27*
Total	79,340,157	94.9	4,243,172	81.2	5,057,141	93.7	88,640,470	94.1	1,695,495	52.28

Note—The percentages of capacity operated are calculated on weekly capacities of 1,599,286 net tons open hearth, 99,962 net tons Bessemer and 103,228 net tons electric ingots and steel for castings, total 1,802,476 net tons; based on annual capacities as of January 1, 1948 as follows: Open hearth 83,610,690 net tons, Bessemer 5,226,000 net tons, Electric 5,396,770 net tons, total 94,233,460 net tons.

Briefs and Bulletins

signed—Allegheny Ludlum Steel Corp. and the CIO United Steelworkers of America signed a Bethlehem-type agreement Monday night, ending a 15-day strike at five company plants. The contract provides $100 monthly pensions at 65, including social security, wholly company-financed, and a social insurance program to which both the company and employes contribute. Formerly the company paid the entire cost of social insurance, and will continue to pay as much as before, but employes will chip in 2½¢ per hr worked for added benefits. The agreement expires 30 days after contracts of most other major producers.

dual plan—Inland Steel's settlement with the union on Friday, Nov. 11, was unique. Two pension plans were accepted by company and union officials. Each worker has the right to choose which one he wants. One is a standard noncontributory plan based on the Bethlehem formula. The other is an "optional plan," which is Inland's voluntary contributory program that the company has had for years. Both plans offer $100 per month minimum pension after 25 years' service.

freight cars—Domestic freight car deliveries during October totaled 4532, according to the American Railway Car Institute. September production was 6141 cars. Orders during October totaled 201, all of which were placed with the car builders. The backlog of orders as of Nov. 1 was: Car builders, 7594; railroad shops, 9783; total, 17,377. This compares with 22,203 on Oct. 1 and 111,405 a year ago.

at capacity—For the first time since last Apr. 28, Republic Steel is operating all four of its southern blast furnaces—two at Birmingham and two at Gadsden. No. 1 blast furnace at Birmingham was taken out of production Apr. 28 and No. 2 at Gadsden had been idle since July 14.

ford expansion—The Ford Motor Co. reports that it is negotiating to buy 55 acres of land in Cincinnati to build an automatic transmission plant. Plans call for the construction of a one-story structure with approximately 400,000 sq ft of floor space.

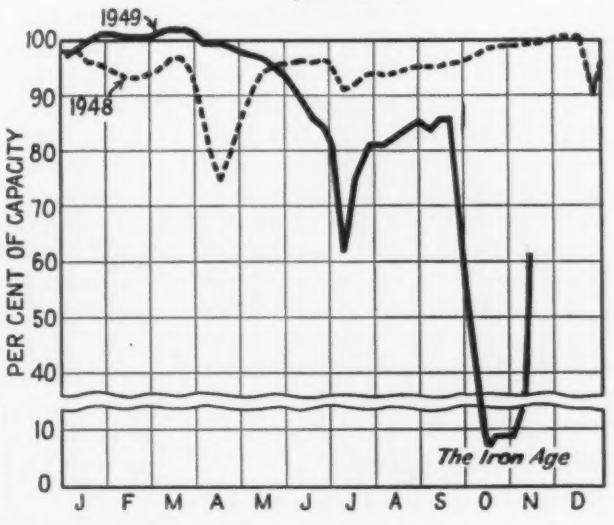
correction—Insurance payments under the Republic Steel Corp. union agreement were incorrectly reported here last week. Employees will continue to pay 3½¢ per hr while the company will contribute 2½¢.

extends licenses—Because of shipping delays caused by the steel strike the Commerce Dept. has granted an automatic 3-month extension for iron and steel export licenses which would have expired between Oct. 1 and Dec. 31. At the same time the department doubled the fourth quarter export quota for scrap by announcing a supplemental 40,000-ton quota for the last 3 months of 1949.

auto stocks—Auto dealer stocks are not believed to be excessive. When factory float, cars in transit and dealer demonstrators are eliminated, the marketable cars in all car dealers' hands today probably total less than 200,000. This is an average of less than five per dealer. At the present rate of production this is less than 2 weeks' output. It is less than 7 days' production at the peak reached a month or two ago.

prefab sale—Lustron Corp. officials are negotiating the sale of 2000 prefabricated houses to American Community Builders, Chicago. The purchase price of the units is believed to be more than $20 million. Approval of the deal by the RFC will be sought before official closing of the transaction.

Steel Operations



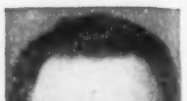
District Operating Rates—Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
November 6....	10.0	5.0	0.0	52.0	0.0	50.0	5.0	5.0*	38.0*	34.0	37.0	91.5	35.0	25.0*
November 13...	45.0	42.5	51.0	83.0	69.0	101.0	80.0	18.0	57.0	35.0	46.0	91.6	61.0	61.5

* Revised.

Nonferrous METALS OUTLOOK

Market Activities



by John Anthony

Upward price movement halts . . . Spread in zinc market . . . Lead price drops ¼¢ . . . Tin price expected to be reduced . . . Heavy copper buying reported.

NONFERROUS METALS PRICES

	Nov. 9	Nov. 10	Nov. 12	Nov. 14	Nov. 15
Copper, electro, Conn.	18.50	18.50	18.50	18.50	18.50
Copper, Lake, Conn.	18.625	18.625	18.625	18.625	18.625
Tin, Grade A, New York	94.00	94.00	94.00	94.00	94.00
Zinc, East St. Louis	9.75-10.00	9.75-10.00	9.75-10.00	9.75-10.00	9.75-10.00
Lead, St. Louis	12.80	12.60	12.60	12.60	12.55

Note: Quotations are going prices.

New York—There was a pause in the upward movement of the metal markets last week as the steel shortages in metal fabricating plants began to take their toll on metal demand.

Last Wednesday, the price of zinc was advanced another ¼¢ bringing the price of Prime Western at East St. Louis to 10.00¢. But all factors in the market did not advance the price. The tonnage being offered at the lower price was more than sufficient to meet the requirements of the market. Galvanizers are buying zinc again, but total demand, notwithstanding the effects of the strikes at two zinc producing plants, has apparently not been sufficient to support the higher price. Early this week producers had not withdrawn the higher price, expecting the market to stiffen with resumption of galvanizing.

Lead Market Weak

On Thursday, the price of lead was reduced another ¼¢ bringing it to 12.75¢ New York. Early this week the major producer had not followed the reduction and was selling principally on an average price basis. The weakness of the lead market is due principally to the substantial shipments of foreign lead that have been coming into the country. Heavy offerings have been coming in the last 6 months from Australia, Yugoslavia, Germany, Japan, as well as Canada and Mexico. Foreign lead has been offered as low as 12.25¢ New York, duty paid. Observers believe that the market might well go somewhat lower and stabilize at perhaps 12.00¢.

The tin market has been very quiet, despite the steel settlements, for most consumers expect to be able to buy well below the present market as soon as the London Metal Exchange gets into operation this week. So far there is no information as to what restrictions might be placed on the free operation of the market by the British government. But observers believe that the price of tin may drop within a short time to a range of 75¢ to 85¢ per lb. In the meantime buyers are staying out of the market.

Brisk Copper Buying

The copper market is very active. The recent increase in price has merely served to whet the appetite of consumers to get in tonnage. It appears that deliveries in November may reach 110,000 tons. At present there are quite a few consumers who have not been able to cover their requirements. The export market has also been showing more activity lately.

The Aluminum Co. of America will meet with the union this week. This will be the first talk since the strike began, idling 15,000 Alcoa workers. Last week the taking of testimony at the government suit against Alcoa came to an end. This trial, which began in 1937, may be brought to an end sometime next year.

Mill Products

Aluminum

(Base prices, cents per pound, base 30,000 lb, f.o.b. shipping point, freight allowed)

Flat Sheet: 0.188 in., 2S, 3S, 26.9¢; 4S, 61S-O, 28.8¢; 52S, 30.9¢; 24S-O, 24S-OAL, 29.8¢; 75S-O, 75S-OAL, 36.3¢; 0.081 in., 2S, 3S, 27.9¢; 4S, 61S-O, 30.2¢; 52S, 32.3¢; 24S-O, 24S-OAL, 30.9¢; 75S-O, 75S-OAL, 38¢; 0.032 in., 2S, 3S, 29.5¢; 4S, 61S-O, 33.5¢; 52S, 36.2¢; 24S-O, 24S-OAL, 37.9¢; 75S-O, 75S-OAL, 47.6¢.

Plate: ¼ in. and heavier: 2S, 3S, F, 23.8¢; 4S-F, 26¢; 52S-F, 27.1¢; 61S-O, 26.6¢; 24S-F, 24S-FAL, 27.1¢; 75S-F, 75S-FAL, 38.9¢.

Extruded Solid Shapes: Shape factors 1 to 4, 33.6¢ to 64¢; 11 to 13, 34.6¢ to 76¢; 23 to 25, 36.7¢ to $1.05; 35 to 37, 44¢ to $1.53; 47 to 49, 63.5¢ to $2.20.

Rod, Rolled: 1.5 to 4.5 in., 2S-F, 3S-F, 34¢ to 30.5¢; Cold-finished, 0.375 to 3 in., 2S, 3S, 36.5¢ to 32¢.

Screw Machine Stock: Drawn, ⅛ to 11/32 in., 11S-T3, R317-T4, 49¢ to 38¢; cold-finished, ⅜ to 1½ in., 11S-T3, 37.5¢ to 35.5¢; ⅜ to 2 in., R317-T4, 37.5¢ to 34.5¢; rolled, 1 9/16 to 3 in., 11S-T3, 35.5¢ to 32.5¢; 2⅛ to 3⅝ in., R317-T4, 33.5¢ to 32.5¢. Base 5000 lb.

Drawn Wire: Coiled, 0.051 to 0.374 in.: 2S, 36¢ to 26.5¢; 52S, 44¢ to 32¢; 56S, 47¢ to 33.5¢; 17S-T4, 50¢ to 34.5¢; 61S-T4, 44.5¢ to 34¢; 75S-T6, 76¢ to 55¢.

Magnesium

(Cents per lb, f.o.b. mill, freight allowed Base quantity 30,000 lb)

Sheets and Plate: Ma, FSa, ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 12, 63¢-65¢; 14, 69¢-74¢; 16, 76¢-81¢; 18, 84¢-89¢; 20, 96¢-$1.01; 22, $1.22-$1.31; 24, $1.62-$1.75. Specification grade higher.

Extruded Round Rod: M, diam in., ¼ to 0.311, 58¢; ½ to ¾, 46¢; 1¼ to 1.749, 43¢; 2½ to 5, 41¢. Other alloys higher.

Extruded Square, Hex. Bar: M, size across flats, in., ¼ to 0.311, 61¢; ½ to 0.749, 48¢; 1¼ to 1.749, 44¢; 2½ to 4, 42¢. Other alloys higher.

Extruded Solid Shapes, Rectangle: M, in weight per ft, for perimeters of less than size indicated, 0.10 to 0.11 lb per ft, per. up to 3.5 in., 55¢; 0.22 to 0.25 lb per ft, per. up to 5.9 in., 51¢; 0.50 to 0.59 lb per ft, per. up to 8.6 in., 47¢; 1.8 to 2.59 lb per ft, per. up to 19.5 in., 44¢; 4 to 6 lb per ft, per. up to 28 in., 43¢. Other alloys higher.

Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.24; 5/16 to ⅜, $1.02; ½ to ⅝, 76¢; 1 to 2 in., 65¢; 0.065 to 0.082, ⅜ to 7/16, 85¢; ⅝ to ¾, 62¢; 1 to 2 in., 57¢; 0.165 to 0.219, ⅝ to ¾, 54.5¢; 1 to 2 in., 53¢; 3 to 4 in., 49¢. Other alloys higher.

Nickel and Monel

(Base prices, cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	60	47
Strip, cold-rolled	66	50
Rods and bars	56	45
Angles, hot-rolled	56	45
Plates	58	46
Seamless tubes	89	80
Shot and blocks		40

Copper, Brass, Bronze

(Cents per lb, freight prepaid on 200 lb)

	Sheets	Rods	Extruded Shapes
Copper	32.18	....	31.78
Copper, h-r	....	28.03	....
Copper, drawn	....	29.28	....
Low brass	30.12	29.81	33.03*
Yellow brass	28.69	28.38	31.70*
Red brass	30.60	30.29	33.51*
Naval brass	33.51	27.57	28.82
Leaded brass	....	23.19	27.22
Com'l bronze	31.61	31.30	34.27*
Manganese bronze	37.01	30.92	32.42
Phosphor bronze	50.90	51.15	....
Muntz metal	31.58	27.14	28.39
Everdur, Herculoy, Olympic, etc.	37.19	36.14	....
Nickel silver, 10 pct	39.66	41.87	46.80
Arch. bronze	....	....	27.22

*Seamless tubing.

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, 10,000 lb, freight allowed	17.00
Aluminum pig	16.00
Antimony, American, Laredo, Tex.	32.00
Beryllium copper, 3.75-4.25% Be dollars per lb contained Be	$24.50
Beryllium aluminum 5% Be, dollars per lb contained Be	$52.00
Bismuth, ton lots	$2.00
Cadmium, del'd	$2.00
Cobalt, 97-99% (per lb)	$1.80 to $1.87
Copper, electro, Conn. Valley	18.50
Copper, lake, Conn. Valley	18.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$100 to $110
Lead, St. Louis	12.55
Lead, New York	12.75
Magnesium, 99.8+%, f.o.b. Freeport, Tex.	20.50
Magnesium, sticks, carlots	34.50
Mercury, dollars per 76-lb flask f.o.b. New York	$72 to $75
Nickel, electro, f.o.b. New York	42.97
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$69 to $72
Silver, New York, cents per oz.	73.25
Tin, New York	94.00
Zinc, East St. Louis	9.75 to 10.00
Zinc, New York	10.47 to 10.72
Zirconium copper, 10-12 pct Zr, per lb contained Zr	$12.00

Remelted Metals

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5-5 ingot		
No. 115	17.75	18.25
No. 120	17.25	17.75
No. 123	16.75	17.25
80-10-10 ingot		
No. 305	....	22.75
No. 315	....	19.75
88-10-2 ingot		
No. 210	....	29.25
No. 215	....	26.25
No. 245	19.25	21.50
Yellow ingot		
No. 405	14.75	16.00
Manganese bronze		
No. 421	....	20.75

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys	
0.30 copper, max.	18.75-19.25
0.60 copper, max.	18.25-18.75
Piston alloys (No. 122 type)	16.50-17.00
No. 12 alum. (No. 2 grade)	15.75-16.50
108 alloy	16.75-17.50
195 alloy	17.50-18.00
13 alloy	18.50-18.75
AXS-679	16.75-17.50
5% Ti, Aluminum, f.o.b., Eddystone, Pa.	
Low copper	31.00
2% copper	28.00

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—95-97½%	17.75-18.50
Grade 2—92-95%	16.75-17.50
Grade 3—90-92%	15.75-16.50
Grade 4—85-90%	14.75-15.50

Electroplating Supplies

Anodes

(Cents per lb, freight allowed, in 500 lb lots)

Copper	
Cast, oval, 15 in. or longer	34⅝
Electrodeposited	28⅞
Rolled, oval, straight, delivered	33.34
Ball anodes	32⅞
Brass, 80-20	
Cast, oval, 15 in. or longer	30⅝
Zinc, oval, 99.886, f.o.b. Detroit	17¼
Ball anodes	16¼
Nickel 99 pct plus	
Cast	59.00
Rolled, depolarized	60.00
Cadmium	$2.15
Silver 999 fine, rolled, 100 oz lots, per troy oz, f.o.b. Bridgeport, Conn.	79

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	45.00
Copper sulfate, 99.5 crystals, bbl	11.10
Nickel salts, single or double, 4-100 lb bags, frt allowed	18.00
Nickel chloride, 300 lb bbl	24.50
Silver cyanide, 100 oz lots, per oz	59
Sodium cyanide, 96 pct domestic 200 lb drums	19.25
Zinc sulfate, crystals, 22.5 pct, bags	6.75
Zinc sulfate, 25 pct, flakes, bbl	7.75

Scrap Metals

Brass Mill Scrap

(Cents per pound; add ½¢ per lb for shipments of 20,000 to 40,000 lb; add 1¢ for more than 40,000 lb)

	Heavy	Turnings
Copper	15½	14¾
Yellow brass	12½	11⅜
Red brass	14	13¼
Commercial bronze	14¼	13½
Manganese bronze	12	11¼
Leaded brass rod ends	12¼	....

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper wire	15.25
No. 2 copper wire	14.25
Light copper	13.25
Refinery brass	13.25*
Radiators	10.25

*Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer)

No. 1 copper wire	15.25
No. 2 copper wire	14.25
Light copper	13.25
No. 1 composition	13.00
No. 1 comp. turnings	12.50
Rolled brass	10.50
Brass pipe	11.50
Radiators	10.50
Heavy yellow brass	10.00
Aluminum	
Mixed old cast	10.50-11.00
Mixed old clips	10.50-11.00
Mixed turnings, dry	8.50- 9.00
Pots and pans	10.50-11.00
Low copper	11.50-12.50

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire	13½—13¾
No. 2 heavy copper and wire	12½—12¾
Light copper	11½—11¾
Auto radiators (unsweated)	8¾— 9
No. 1 composition	11 —11¼
No. 1 composition turnings	10½—10¾
Clean red car boxes	9¼— 9½
Cocks and faucets	9¼— 9½
Mixed heavy yellow brass	7¼— 7½
Old rolled brass	8½— 8¾
Brass pipe	9¾—10
New soft brass clippings	10½—11
Brass rod ends	9¾—10
No. 1 brass rod turnings	9½— 9¾

Aluminum

Alum. pistons and struts	5 — 5½
Aluminum crankcases	8 — 8½
2S aluminum clippings	11 —11½
Old sheet and utensils	8 — 8½
Borings and turnings	4
Misc. cast aluminum	8 — 8½
Dural clips (24S)	8 — 8½

Zinc

New zinc clippings	6 — 6½
Old zinc	4½— 5
Zinc routings	2½— 3
Old die cast scrap	3¼— 3½

Nickel and Monel

Pure nickel clippings	21 —23
Clean nickel turnings	14 —15
Nickel anodes	20 —22
Nickel rod ends	20 —22
New Monel clippings	12 —14
Clean Monel turnings	8 — 9
Old sheet Monel	10 —12
Old Monel castings	9 —10
Inconel clippings	11 —13
Nickel silver clippings, mixed	8 —10
Nickel silver turnings, mixed	6 — 7

Lead

Soft scrap, lead	9½—10
Battery plates (dry)	5¼— 5½

Magnesium

Segregated solids	9 —10
Castings	5½— 6½

Miscellaneous

Block tin	70 —72
No. 1 pewter	43 —45
No. 1 auto babbitt	38 —40
Mixed common babbitt	10 —10¼
Solder joints	11½—12
Siphon tops	44 —46
Small foundry type	12½—13
Monotype	11½—12
Lino. and stereotype	10¾—11¼
Electrotype	9¼— 9½
New type shell cuttings	11½—11¾
Hand picked type shells	5 — 5½
Lino. and stereo. dross	4¾— 5
Electro. dross	2¾— 3

MARKETS—PRICES—TRENDS

SCRAP
Iron & Steel

Price Advance Continues in a Dull Market

The market undertone continues strong with most areas registering price advances in the steelmaking grades. Tonnages moved were still small as most mills have not yet entered the market for large commitments. The air was filled with rumors from the mills, brokers and dealers, and in most instances this tended to make everyone cautious about making future commitments. The general consensus of the trade is that higher prices will be in evidence before substantial tonnages of yard material will be moved.

Last week the Dept. of Commerce established a supplemental fourth quarter export quota of 40,000 tons for iron and steel scrap. This brings the total iron and steel scrap quota for the October-December period of this year to 80,000 tons.

The top quotation of No. 1 steel was up $6.00 in Cleveland; in Youngstown it was up $3.00; in Detroit, St. Louis and Birmingham it was up $2.00; in Boston it was up $1.50; in Pittsburgh, Philadelphia and Cleveland it was up $1.00; and in Buffalo it was up 50¢. THE IRON AGE scrap composite is up 66¢ to $29.58 per gross ton.

PITTSBURGH—The market undertone continued very strong this week, but activity was only moderate. No. 1 heavy melting was up $1.00 to a top of $33.00, as one district mill stepped into the market. The mills and brokers appeared to be playing a cat-and-mouse game which tended to restrain the upward trend. However, there was not too much tonnage moving as sellers held out for higher prices.

CHICAGO—The market marked time here awaiting resumption of operations and the receipt of shipping releases against tonnages already purchased. Speculation of higher prices did not cease but it slowed down. Some dealers who had refused to sell started weakening on the basis that maybe they should cash in now rather than gamble on higher prices later. Railroad scrap prices advanced again on practically all items. Cast prices, some predict, are destined to reach close to last year's high before Jan. 1. However, predominant opinion is still that prices generally will not run away but will advance steadily in the next few months.

PHILADELPHIA—Although there was no mill buying here, the market was stronger based on higher prices being offered for heavy shipment of steel grades to Pittsburgh. Two mills released shipments on old orders last week following settlement with the union. Market sentiment is very strong. Cast is firm, with pipe mills buying at the higher price. Steel grades are up $1.00 a ton. Yard and machinery cast are also up $1.00. Low phos grades are up 50¢.

NEW YORK—Prices here are strong and the supply situation is very tight. There are all sorts of rumors concerning prices and it will be another week before the present trend will be clarified. Dealers are still reluctant to part with their stored material and are only moving incoming shipments. The cast grades are firm, but the movement is not as strong as has been expected.

DETROIT—The return to operation of major steel mills has created only mild activity in the Detroit scrap market thus far. However, the air is full of rumors and dealers and brokers are being equally cautious about making commitments. There is no doubt that the underlying tone of the market is very strong. Most market observers feel a price of $30.00 or higher will be required to move a substantial proportion of the scrap now held in local dealers' yards. At the other end of the scale—and excepting electric furnace buyers—major mills are showing little open interest in immediate scrap buying.

CLEVELAND—Based on sales of substantial tonnages, scrap prices advanced here and in the Valley this week. The market is strong with brokers trying to buy and dealers hanging onto their tonnage. Those holding the biggest tonnage are the most bullish. On the other hand, brokers are paying as much as they are getting, and taking a loss on some orders.

BOSTON—The upswing is continuing in the scrap market with No. 1 steel moving to another new high of $21.00 to $21.50, which is the best price in 9 months. Other categories stiffened and prices are up 50¢ to $1.50. Activity is only fair, but slightly better than it has been. Cast shows no change and a little lesser movement.

BUFFALO—Sales at slightly higher levels were expected to take place in the scrap market within the week. Although most prices were unchanged negotiations were under way between dealers and one of the leading mill consumers for a substantial tonnage at prices exceeding the present range of $25.50-$26.00 for No. 1 heavy melting and related items. New business was near as dealers reported large prestrike contracts virtually cleared.

CINCINNATI—Sales of representative tonnages of scrap late last week to major consumers in this district brought the market here to a peak in trading activity. Brokers are buying speculatively, and some of the dealers are beginning to unload tonnage that has been on the ground for weeks. According to trade sources a lull, or interim period will develop during the next 2 or 3 weeks which will be culminated in sales at higher prices. Foundry grades are stronger sympathetically, with the increased movement of openhearth and electric furnace grades from remote points.

ST. LOUIS—Although the steel mills have not come into the market for any considerable tonnage of scrap iron small lots of No. 2 heavy melting and No. 2 bundled sheets were sold. The mills are said to be awaiting the effect of the strike on the Chicago market before making any heavy commitments. In the meantime, there is still some short interest and the brokers are paying $1.00 more for No. 1 and 2 heavy melting steel and No. 2 bundled sheets.

BIRMINGHAM—Openhearth grades of steel have advanced $2.00 in this market and the price undertone is strong throughout the scrap list. Openhearth steel grades advanced even though Republic Steel put both blast furnaces at Gadsden on basis iron for the first time since July 14 and as a result will use less purchased openhearth material.

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Scrap IRON & STEEL Prices

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$32.50 to $33.00
No. 2 hvy. melting	30.00 to 30.50
No. 1 bundles	32.50 to 33.00
No. 2 bundles	25.00 to 25.50
Machine shop turn.	22.00 to 22.50
Mixed bor. and ms. turns.	22.00 to 22.50
Shoveling turnings	23.50 to 24.00
Cast iron borings	22.50 to 23.00
Low phos. plate	34.00 to 34.50
Heavy turnings	**24.00 to 25.00**
No. 1 RR. hvy. melting	33.50 to 34.00
Scrap rails, random lgth.	35.00 to 36.00
Rails 2 ft and under	40.00 to 41.00
RR. steel wheels	34.00 to 35.00
RR. spring steel	34.00 to 35.00
RR. couplers and knuckles	34.00 to 35.00
No. 1 machinery cast.	**39.00 to 40.00**
Mixed yard cast.	37.00 to 38.00
Heavy breakable cast.	**29.00 to 30.00**
Malleable	33.00 to 34.00

Chicago

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 factory bundles	30.00 to 31.00
No. 1 dealers' bundles	28.00 to 29.00
No. 2 dealers' bundles	25.00 to 26.00
Machine shop turn.	21.00 to 22.00
Mixed bor. and turn.	21.00 to 22.00
Shoveling turnings	22.00 to 23.00
Cast iron borings	20.00 to 21.00
Low phos. forge crops	36.00 to 37.00
Low phos. plate	34.00 to 35.00
No. 1 RR. hvy. melting	35.00 to 36.00
Scrap rails, random lgth.	41.00 to 42.00
Rerolling rails	47.00 to 48.00
Rails 2 ft and under	45.00 to 46.00
Locomotive tires, cut	42.00 to 43.00
Cut bolsters & side frames	34.00 to 35.00
Angles and splice bars	39.00 to 40.00
RR. steel car axles	48.00 to 49.00
No. 3 steel wheels	36.00 to 37.00
RR. couples and knuckles	37.00 to 38.00
No. 1 machinery cast.	44.00 to 46.00
No. 1 agricul. cast.	43.00 to 44.00
Heavy breakable cast.	39.00 to 40.00
RR. grate bars	34.00 to 35.00
Cast iron brake shoes	32.00 to 33.00
Cast iron car wheels	39.00 to 40.00
Malleable	39.00 to 40.00

Philadelphia

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 bundles	25.00 to 26.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	16.00 to 17.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	16.50 to 17.50
Low phos. punchings, plate	27.00 to 28.00
Low phos. 5 ft and under	26.00 to 26.50
Low phos. bundles	26.00 to 26.50
Hvy. axle forge turn.	25.00 to 26.00
Clean cast chem. borings	26.00 to 27.00
RR. steel wheels	29.00 to 29.50
RR. spring steel	29.00 to 29.50
Rails 18 in. and under	38.00 to 40.00
No. 1 machinery cast	37.00 to 39.00
Mixed yard cast	35.00 to 36.00
Heavy breakable cast	33.00 to 34.00
Cast iron carwheels	34.00 to 35.00
Malleable	34.00 to 35.00

Cleveland

No. 1 hvy. melting	$34.50 to $35.00
No. 2 hvy. melting	32.50 to 33.00
No. 1 busheling	34.50 to 35.00
No. 1 bundles	34.50 to 35.00
No. 2 bundles	30.00 to 30.50
Machine shop turn.	24.00 to 24.50
Mixed bor. and turn.	24.00 to 24.50
Shoveling turnings	26.00 to 26.50
Cast iron borings	25.00 to 25.50
Low phos. 2 ft and under	35.50 to 36.00
Steel axle turn.	34.50 to 35.00
Drop forge flashings	34.50 to 35.00
No. 1 RR. hvy. melting	33.50 to 34.00
Rails 3 ft and under	43.00 to 44.00
Rails 18 in. and under	44.00 to 45.00
No. 1 machinery cast.	44.00 to 45.00
RR. cast.	44.00 to 45.00
RR. grate bars	**32.00 to 33.00**
Stove plate	36.00 to 37.00
Malleable	38.00 to 39.00

Youngstown

No. 1 hvy. melting	$35.50 to $36.00
No. 2 hvy. melting	33.50 to 34.00
No. 1 bundles	35.50 to 36.00
No. 2 bundles	$31.50 to $32.00
Machine shop turn.	25.50 to 26.00
Shoveling turnings	27.50 to 28.00
Cast iron borings	26.50 to 27.00
Low phos. plate	36.50 to 37.00

Buffalo

No. 1 hvy. melting	$28.00 to $28.50
No. 2 hvy. melting	25.50 to 26.00
No. 1 busheling	25.50 to 26.00
No. 1 bundles	26.50 to 27.50
No. 2 bundles	24.50 to 25.00
Machine shop turn.	19.00 to 19.50
Mixed bor. and turn.	20.00 to 20.50
Shoveling turnings	21.50 to 22.00
Cast iron borings	20.00 to 20.50
Low phos. plate	29.50 to 30.00
Scrap rails, random lgth.	33.50 to 34.00
Rails 2 ft and under	37.50 to 38.00
RR. steel wheels	33.50 to 34.00
RR. spring steel	33.50 to 34.00
RR. couplers and knuckles	33.50 to 34.00
No. 1 cupola cast	38.00 to 38.50
Mixed yard cast	36.00 to 36.50
Stove plate	35.00 to 35.50
Small indus. malleable	24.00 to 24.50

Birmingham

No. 1 hvy. melting	$27.00
No. 2 hvy. melting	26.00
No. 2 bundles	24.00
No. 1 busheling	26.00
Machine shop turn.	**$16.00 to 17.00**
Shoveling turnings	20.00
Cast iron borings	19.00
Bar crops and plate	**29.00 to 30.00**
Structural and plate	**29.00 to 30.00**
No. 1 RR. hvy. melt.	29.00 to 29.50
Scrap rails, random lgth.	31.00 to 32.00
Rerolling rails	36.00 to 37.00
Rails 2 ft and under	**34.00 to 35.00**
Angles & splice bars	33.00 to 34.00
Std. steel axles	**28.00 to 29.00**
No. 1 cupola cast	**34.00 to 35.00**
Stove plate	28.00 to 29.00
Cast iron carwheels	28.00 to 29.00

St. Louis

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	26.00 to 27.00
No. 2 bundled sheets	26.00 to 27.00
Machine shop turn.	**19.00 to 20.00**
Shoveling turnings	21.00 to 22.00
Rails, random lengths	35.00 to 36.00
Rails 3 ft and under	38.00 to 40.00
Locomotive tires, uncut	29.00 to 30.00
Angles and splice bars	37.00 to 38.00
Std. steel car axles	40.00 to 42.00
RR. spring steel	33.00 to 35.00
No. 1 machinery cast	37.00 to 38.00
Hvy. breakable cast.	**31.00 to 32.00**
Cast iron brake shoes	**31.00 to 32.00**
Stove plate	**33.00 to 35.00**
Cast iron car wheels	**34.00 to 35.00**
Malleable	**30.00 to 32.00**

New York

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$21.50 to $22.00
No. 2 hvy. melting	19.50 to 20.00
No. 2 bundles	18.00 to 19.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	11.00 to 12.00
Shoveling turnings	12.50 to 13.50
Clean cast chem. bor.	22.50 to 23.50
No. 1 machinery cast	**31.00 to 32.00**
Mixed yard cast.	29.00 to 30.00
Charging box cast.	27.00 to 28.00
Heavy breakable cast.	27.00 to **28.00**
Unstrp. motor blocks	25.00 to 26.00

Boston

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$21.00 to $21.50
No. 2 hvy. melting	18.00 to 18.50
No. 1 bundles	21.00 to 21.50
No. 2 bundles	$16.50 to $17.00
Machine shop turn.	11.50 to 12.00
Mixed bor. and turn.	11.00 to 11.50
Shoveling turnings	13.00 to 13.50
No. 2 bushelings	13.50 to 14.00
Clean cast chem. borings	18.50 to 19.50
No. 1 machinery cast.	**32.00 to 34.00**
No. 2 machinery cast.	**28.00 to 29.00**
Heavy breakable cast.	**25.00 to 26.00**
Stove plate	25.00 to 26.00

Detroit

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 bundles	27.00 to 28.00
New bushelings	27.00 to 28.00
Flashings	25.00 to 26.00
Machine shop turn.	17.00 to 18.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	19.00 to 20.00
Low phos. plate	27.00 to 28.00
No. 1 cupola cast	35.00 to 36.00
Heavy breakable cast	29.00 to 30.00
Stove plate	28.00 to 29.00
Automotive cast	35.00 to 36.00

Cincinnati

Per gross ton, f.o.b. cars:

No. 1 hvy. melting	$29.50 to $30.00
No. 2 hvy. melting	26.50 to 27.00
No. 1 bundles	29.50 to 30.00
No. 2 bundles	23.50 to 24.00
Machine shop turn.	17.50 to 18.00
Mixed bor. and turn.	17.50 to 18.00
Shoveling turnings	19.50 to 20.00
Cast iron borings	18.50 to 19.00
Low phos. 18 in. under	37.00 to 38.00
Rails, random lengths	36.00 to 37.00
Rails, 18 in. and under	44.00 to 45.00
No. 1 cupola cast	41.00 to 42.00
Hvy. breakable cast	34.00 to 35.00
Drop broken cast	44.00 to 45.00

San Francisco

No. 1 hvy. melting	**$20.00**
No. 2 hvy. melting	**18.00**
No. 1 bundles	**16.00**
No. 2 bundles	**16.00**
No. 3 bundles	**13.00**
Machine shop turn	**9.00**
Elec. fur 1 ft and under	28.00
No. 1 RR. hvy. melting	20.00
Scrap rails, random lgth.	20.00
No. 1 cupola cast.	$30.00 to 35.00

Los Angeles

No. 1 hvy. melting	**$20.00**
No. 2 hvy. melting	**18.00**
No. 1 bundles	**16.00**
No. 2 bundles	**16.00**
No. 3 bundles	**13.00**
Mach. shop turn.	**12.00**
Elec. fur. 1 ft and under	**30.00**
No. 1 RR. hvy. melting	**20.00**
No. 1 cupola cast.	**$36.00 to 40.00**

Seattle

No. 1 hvy. melting	$18.00
No. 2 hvy. melting	**16.00**
No. 1 bundles	16.00
No. 2 bundles	16.00
No. 3 bundles	**12.00**
Elec. fur. 1 ft and under	27.50
RR. hvy. melting	**19.00**
No. 1 cupola cast	**$27.00 to 30.00**
Heavy breakable cast	**20.00**

Hamilton, Ont.

Cast grades f.o.b. shipping point:

No. 1 hvy. melting	$24.00
No. 1 bundles	16.00
No. 2 bundles	16.00
Mechanical bundles	22.00
Mixed steel scrap	20.00
Mixed bor. and turn.	18.00
Rails, remelting	24.00
Rails, rerolling	27.00
Bushelings	18.50
Bush., new fact, prep'd.	22.00
Bush., new fact, unprep'd	17.00
Short steel turnings	18.00
Cast scrap	$40.00 to 43.00

For the Purchase or Sale of

Iron and Steel Scrap . . .

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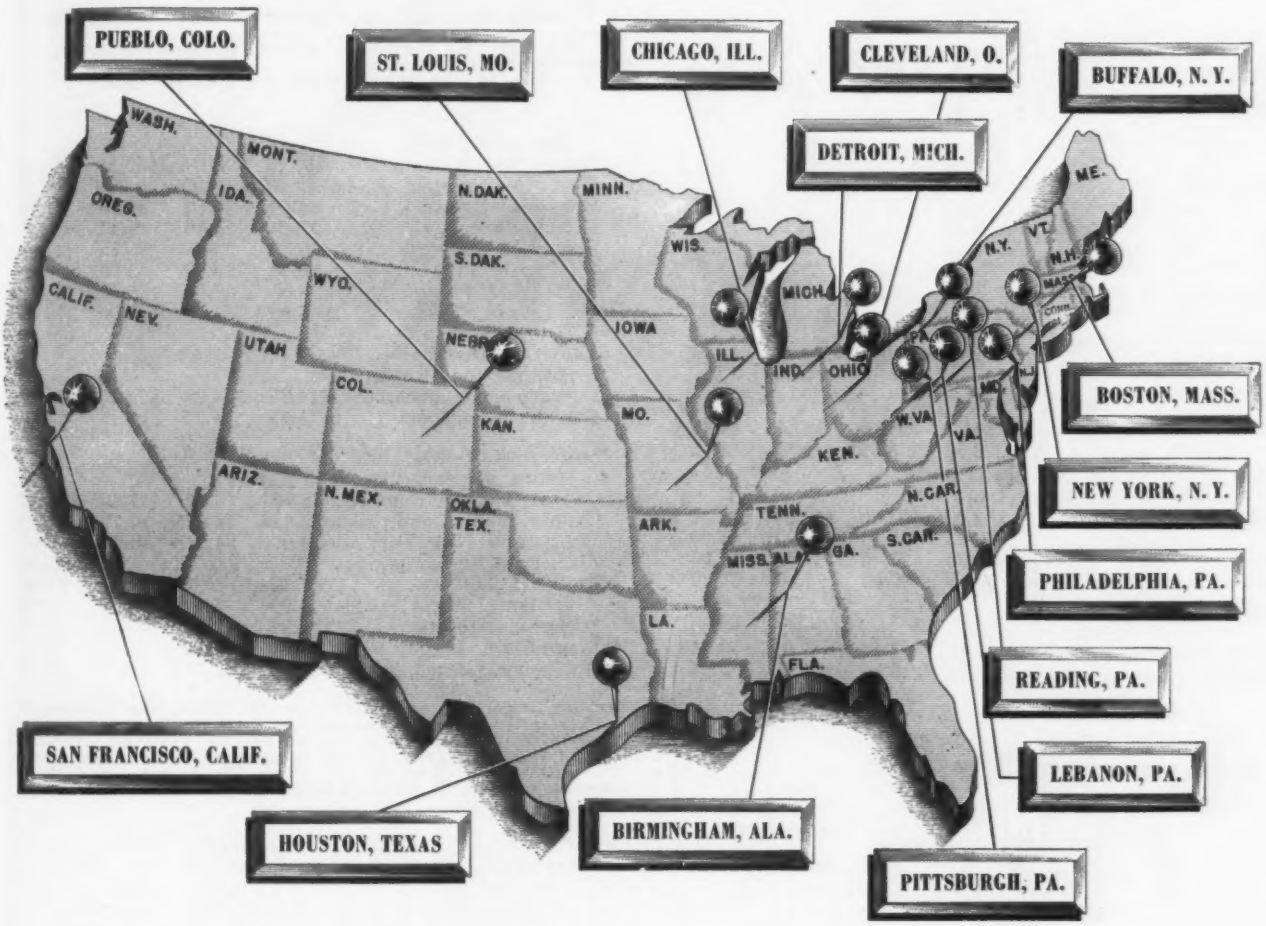

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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Comparison of Prices

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat-Rolled Steel: (cents per pound)	Nov. 15, 1949	Nov. 8, 1949	Oct. 18, 1949	Nov. 16, 1948
Hot-rolled sheets	3.25	3.25	3.25	3.26
Cold-rolled sheets	4.00	4.00	4.00	4.00
Galvanized sheets (10 ga)	4.40	4.40	4.40	4.40
Hot-rolled strip	3.25	3.25	3.25	3.265
Cold-rolled strip	4.038	4.038	4.038	4.063
Plates	3.40	3.40	3.40	3.42
Plates wrought iron	7.85	7.85	7.85	7.85
Stains C-R strip (No. 302)	33.00	33.00	33.00	33.25
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb) cokes	$7.75	$7.75	$7.75	$6.80
Tinplate, electro (0.50 lb)	6.70	6.70	6.70	6.00
Special coated mfg. ternes	6.65	6.65	6.65	5.90
Bars and Shapes: (cents per pound)				
Merchant bars	3.35	3.35	3.35	3.37
Cold-finished bars	3.995	3.995	3.995	3.995
Alloy bars	3.75	3.75	3.75	3.75
Structural shapes	3.25	3.25	3.25	3.25
Stainless bars (No. 302)	28.50	28.50	28.50	28.50
Wrought iron bars	9.50	9.50	9.50	9.50
Wire: (cents per pound)				
Bright wire	4.15	4.15	4.15	4.256
Rails: (dollars per 100 lb)				
Heavy rails	$3.20	$3.20	$3.20	$3.20
Light rails	3.55	3.55	3.55	3.55
Semifinished Steel: (dollars per net ton)				
Rerolling billets	$52.00	$52.00	$52.00	$52.00
Slabs, rerolling	52.00	52.00	52.00	52.00
Forging billets	61.00	61.00	61.00	61.00
Alloy blooms, billets, slabs	63.00	63.00	63.00	63.00
Wire rod and Skelp: (cents per pound)				
Wire rods	3.40	3.40	3.40	3.619
Skelp	3.25	3.25	3.25	3.25

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

Pig Iron: (per gross ton)	Nov. 15, 1949	Nov. 8, 1949	Oct. 18, 1949	Nov. 16, 1948
No. 2, foundry, Phila.	$50.42	$50.42	$50.42	$51.56
No. 2, Valley furnace	46.50	46.50	46.50	46.50
No. 2, Southern Cin'ti	46.08	46.08	46.08	49.47
No. 2, Birmingham	39.38	39.38	39.38	43.38
No. 2, foundry, Chicago†	46.50	46.50	46.50	46.50
Basic del'd Philadelphia	49.92	49.92	49.92	50.76
Basic, Valley furnace	46.00	46.00	46.00	46.00
Malleable, Chicago†	46.50	46.50	46.50	46.50
Malleable, Valley	46.50	46.50	46.50	46.50
Charcoal, Chicago	68.56	68.56	68.56	73.78
Ferromanganese‡	173.40	173.40	173.40	161.71

†The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡Average of U. S. prices quoted on Ferroalloy page.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$32.75	$31.75	$29.50	$42.75
Heavy melt'g steel, Phila.	25.50	24.50	24.50	44.50
Heavy melt'g steel, Ch'go	30.50	30.50	25.50	41.75
No. 1 hy. comp. sh't Det.	27.50	25.50	19.50	38.00
Low phos. Young'n	36.75	33.75	31.75	47.75
No. 1, cast, Pittsburgh	39.50	39.50	39.50	70.00
No. 1, cast, Philadelphia	38.00	37.00	35.50	66.50
No. 1, cast, Chicago	45.00	44.00	42.00	72.50
Coke: Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.25	$14.25	$14.25	$15.00
Foundry coke, prompt	15.75	15.75	15.75	17.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro, Conn.	18.50	18.50	17.625	23.50
Copper, Lake Conn.	18.625	18.625	17.75	23.625
Tin Straits, New York	94.00	94.00	95.75	$1.03
Zinc, East St. Louis	9.75	9.75	9.25	17.50
Lead, St. Louis	*12.55*	12.80	12.80	21.30
Aluminum, virgin	17.00	17.00	17.00	17.00
Nickel electrolytic	42.97	42.97	42.97	42.90
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	32.00	32.00	32.00	35.00

Composite Prices

Starting with the issue of May 12, 1949, the weighted finished steel composite was revised for the years 1941 to date. The weights used are based on the average product shipments for the 7 years 1937 to 1940 inclusive and 1946 to 1948 inclusive. The use of quarterly figures has been eliminated because it was too sensitive. (See p. 139 of May 12, 1949, issue.)

	Finished Steel Base Price	Pig Iron	Scrap Steel
Nov. 15, 1949	3.705¢ per lb.	$45.88 per gross ton	$29.58 per gross ton
One week ago	3.705¢ per lb.	45.88 per gross ton	28.92 per gross ton
One month ago	3.705¢ per lb.	45.88 per gross ton	26.50 per gross ton
One year ago	3.720¢ per lb.	46.91 per gross ton	43.00 per gross ton

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Scrap Steel High	Scrap Steel Low
1949	3.720¢ Jan. 1	3.705¢ May 3	$46.82 Jan. 4	$45.88 Sept. 6	$43.00 Jan. 1	$19.33 June 28
1948	3.721¢ July 27	3.193¢ Jan. 1	46.91 Oct. 12	39.58 Jan. 6	43.16 July 27	39.75 Mar. 9
1947	3.193¢ July 29	2.848¢ Jan. 1	37.98 Dec. 30	30.14 Jan. 7	42.58 Oct. 28	29.50 May 20
1946	2.848¢ Dec. 31	2.464¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.464¢ May 29	2.396¢ Jan. 1	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.396¢	2.396¢	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.396¢	2.396¢	23.61	23.61	$19.17	$19.17
1942	2.396¢	2.396¢	23.61	23.61	19.17	19.17
1941	2.396¢	2.396¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue and in May 12, 1949.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

Fifty years of service

1899—1949

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STEEL PRICES

Smaller numbers in price boxes indicate producing companies. For main office locations, see key on facing page.
Base prices at producing points apply only to sizes and grades produced in these areas. Prices are in cents per lb unless otherwise noted. Extras apply.

	Pittsburgh	Chicago	Gary	Cleveland	Canton Massillon	Middletown	Youngstown	Bethlehem	Buffalo	Conshohocken	Johnstown	Sparrows Point	Granite City	Detroit
INGOTS Carbon forging, net ton	$50.00 1													$50.00 31
Alloy, net ton	$51.00 1.17													$51.00 31
BILLETS, BLOOMS, SLABS Carbon, rerolling net ton	$52.00 1	$52.00 1	$52.00 1				$52.00 13		$52.00 3	$57.00 26	$52.00 3			
Carbon forging billets, net ton	$61.00 1	$61.00 1.4	$61.00 1.8	$61.00 4			$61.00 25		$61.00 3.4	$63.00 26	$61.00 3			$61.00 31
Alloy, net ton	$63.00 1.17	$63.00 1.4	$63.00 1		$63.00 4.42		$63.00 13	$63.00 3	$63.00 3.4	$65.00 26	$63.00 3			$63.00 31
SHEET BARS							$52.00 13							
PIPE SKELP	3.25 1.5						3.25 1.4							
WIRE RODS	3.40 2.18	3.40 2.4.33	3.40 6	3.40 3			3.40 6				3.40 3	3.50 3		
SHEETS Hot-rolled (18 ga. & hvr.)	3.25 1.5.9.15	3.25 23	3.25 1.6.8	3.25 4.5			3.25 1.4.6.13		3.25 3	3.35 26		3.25 3		3.45 12
Cold-rolled	4.00[1.5] 7.9.15.62		4.00 1.6.8	4.00 4.5		4.00 7	4.00 4.6		4.00 3			4.00 3	4.20 22	4.20 12
Galvanized (10 gage)	4.40 1.9.15		4.40 1.8		4.40 4		4.40 64					4.40 3		
Enameling (12 gage)	4.40 1		4.40 1.8	4.40 4		4.40 7	4.40 6						4.60 22	4.70 12
Long ternes (10 gage)	4.80 9.15		4.80 1			4.80 7								
Hi Str. low alloy, h.r.	4.95 1.5.9	4.95 1	4.95 1.6.8	4.95 4.5			4.95 1.4.6.13		4.95 3	4.95 26		4.95 3		5.15 12
Hi Str. low alloy c.r.	6.05 1.5		6.05 1.6.8	6.05 4.5			6.05 4.6.13		6.05 3			6.05 3		6.25 12
Hi Str. Low alloy, galv.	6.75 1			6.75 4	6.75 4							6.75 3		
STRIP Hot-rolled	3.25 5.7.9.28	3.25 23.66	3.25 1.6.8	3.25 5			3.25 1.4.6.13		3.25 3			3.25 3		3.45 12.47
Cold-rolled	4.00 5.7.9.62	4.15 66	4.00 8	4.00 2.5		4.00 7	4.00 4.6.13.40.48.49		4.00 3			4.00 3		4.20[12.47] 4.25[66.81]
Hi Str. low alloy, h.r.	4.95 5		4.95 1.6.8	4.95 5			4.95 1.4.6.13		4.95 3			4.95 3		5.15 12
Hi Str. low alloy c.r.	6.05 5.9			6.05 2.5			6.05 4.6.13		6.05 3			6.05 3		6.25 12
TINPLATE† Cokes, 1.50-lb. base box	$7.75 1.5.9.15		$7.75 1.6.8				$7.75 4					$7.85 3	$7.95 22	
Electrolytic 0.25, 0.50, 0.75 lb box	Deduct $1.30, $1.05 and 75¢ respectivel, from 1.50-lb coke base box price													
BLACKPLATE, 29 gage Hollowware enameling	5.30 1.5.15		5.30 1.6.8				5.30 4					5.40 3	5.50 22	
BARS Carbon steel	3.35 1.5.9.17	3.35 1.4.23	3.35 1.6.8	3.35 4	3.35 4		3.35 1.4.6		3.35 3.4		3.35 3			3.55 12
Reinforcing††	3.35 1.5	3.35 4	3.35 1.6.8	3.35 4	3.35 4		3.35 1.4.6		3.35 3.4		3.35 3	3.35 3		
Cold-finished	3.95[5] 4.00[2.4] 17.52.69.71	4.00[3] 23.69.70	4.00 4.73.74	4.00 2.61	4.00 4.62		4.00 6.40.57		4.00 70					4.30 12
Alloy, hot-rolled	3.75 1.17	3.75 1.4.23	3.75 1.6.8		3.75 4.42		3.75 1.6.25	3.75 3	3.75 3.4		3.75 3			4.05 12
Alloy, cold-drawn	4.65 2.17.52.69.71	4.65 2.23.69.70	4.65 4.73.74	4.65 2.61	4.65 4.43.52		4.65 6.25.57	4.65 3	4.65 3.70					
Hi Str. low alloy, h.r.	5.10 1.5		5.10 1.6.8	5.10 4			5.10 1.6	5.10 3	5.10 3		5.10 3			5.30 12
PLATE Carbon Steel	3.40 1.5	3.40 1	3.40 1.6.8	3.40 4			3.40 13		3.40 3	3.50 26	3.40 3	3.40 3		3.65 2
Floor plates	4.55 1	4.55 1	4.55 8	4.55 5						4.55 26				
Alloy	4.40 1	4.40 1	4.40 1				4.40 13			4.40 26	4.40 3	4.40 3		
Hi Str. low alloy	5.20 1.5	5.20 1	5.20 1.8	5.20 4.5			5.20 6			5.20 26	5.20 3	5.20 3		5.45 12
SHAPES, Structural	3.25 1.5.9	3.25 1.23	3.25 1.6.8					3.30 3	3.30 3		3.30 3			
Hi Str. low alloy	4.95 1.5	4.95 1	4.95 1.6.8				4.95 6	5.05 3	5.05 3		5.05 3			
MANUFACTURERS' WIRE Bright	4.15 2.5.15	4.15[2] 4.33.34		4.15 2.77			4.15 6				4.15 3	4.25 3	Duluth=4.15[2] Pueblo=4.50[14]	
PILING, Steel sheet	4.05 1.9	4.05 1							4.05 3					

UNIVERSITY OF MICHIGAN LIBRARIES

STEEL PRICES

Smaller numbers indicate producing companies. See key at right.
Prices are in cents per lb unless otherwise noted. Extras apply.

Kansas City	Houston	Birmingham	WEST COAST Seattle, San Francisco, Los Angeles, Fontana		
					INGOTS Carbon forging, net ton
	$59.00 83				Alloy, net ton
		$52.00 11	F=$71.00[19]		BILLETS, BLOOMS, SLABS Carbon, rerolling, net ton
	$69.00 83	$61.00 11	F=$80.00[19]	Geneva=$61.00[16]	Carbon forging billets, net ton
	$71.00 83		F=$82.00[19]		Alloy net ton
				Mansfield=$58.00 G. T.[75] Portsmouth=$55.00[20]	SHEET BARS
					PIPE SKELP
	3.95 83		SF, LA=4.05[24] LA=4.20[62]	Portsmouth=3.40[20] Worcester=3.70[2]	WIRE RODS
		3.25 4.11	LA=3.95[24] F=4.15[19]	Kokomo,[30] Ashland[7]=3.25	SHEETS Hot-rolled (18 ga. & hvr.)
		4.00 11	SF=4.95[24] F=4.90[19]		Cold-rolled
		4.40 4.11	SF, LA=5.15[24]	Ashland=4.40[7]	Galvanized (10 gage)
					Enameling (12 gage)
					Long ternes (10 gage)
		4.95 11			Hi Str low alloy, h.r.
					Hi Str. low alloy, c.r.
					Hi Str. low alloy, galv.
3.85 83	3.65 83	3.25 11	SF, LA=4.00[62] F=4.40[19], S=4.25[62]	Ashland=3.25[7] Atlanta=3.40[65]	STRIP Hot-rolled
			F=4.90[19]	New Haven=4.50[2,68]	Cold-rolled
		4.95 11			Hi Str. low alloy, h.r.
			F=6.95[19]		Hi Str low alloy, c.r.
		$7.85 11	SF=$8.50[24]		TINPLATE Cokes, 1.50-lb. base box
Deduct $1.30, $1.05 and 75¢ respectively from 1.50-lb coke base box price					Electrolytic 0.25, 0.50, 0.75 lb box
					BLACKPLATE, 29 gage Hollowware enameling
3.95 83	3.75 83	3.35 4.11	SF, LA=4.05[24] LA=4.05[62]	Atlanta=3.50[65]	BARS Carbon steel
3.95 83	3.75 83	3.35 4.11	SF, S=4.10[62] F=4.00[19]	Atlanta=3.50[65]	Reinforcing††
				Putnam, Newark=4.40[69] Cumberland=3.95[72]	Cold-finished
4.35 83			LA=4.80[62] F=4.75[19]		Alloy, hot-rolled
				Newark,[69] Worcester[2]=4.95	Alloy, cold-drawn
		5.10 4			Hi Str. low alloy, h.r.
	3.80 83	3.40 4.11	F=4.00[19] S=4.30[62] Geneva=3.40[16]	Claymont=3.50[29] Coatesville=3.50[21] Harrisburg=3.75[35]	PLATE Carbon steel
				Harrisburg=4.55[35]	Floor plates
				Coatesville=4.50[21]	Alloy
		5.20 11		Geneva=5.20[16]	Hi Str. low alloy
3.85 83	3.65 83	3.25 11	SF=3.80[62] LA=3.85,[62] 3.95[24]		SHAPES, Structural
		4.95 11	F=3.80[19] S=3.90[62]		Hi Str. low alloy
4.75 83	4.55 83	4.15 4.11	SF, LA=5.10[24] LA=5.10[62]	Portsmouth=4.15[20] Worcester=4.45[2]	MANUFACTURERS' WIRE Bright

Notes: †Special coated mfg ternes, deduct $1.10 from 1.50-lb coke base box price. Can-making quality blackplate, 55 to 128-lb, deduct $2.00 from 1.50-lb coke base box. ‡Straight lengths only from producer to fabricator.

KEY TO STEEL PRODUCERS

With Principal Offices

1 Carnegie-Illinois Steel Corp., Pittsburgh
2 American Steel & Wire Co., Cleveland
3 Bethlehem Steel Co., Bethlehem
4 Republic Steel Corp., Cleveland
5 Jones & Laughlin Steel Corp., Pittsburgh
6 Youngstown Sheet & Tube Co., Youngstown
7 Armco Steel Corp., Middletown, Ohio
8 Inland Steel Co., Chicago
9 Weirton Steel Co., Weirton, W. Va.
10 National Tube Co., Pittsburgh
11 Tennessee Coal, Iron & R.R. Co., Birmingham
12 Great Lakes Steel Corp., Detroit
13 Sharon Steel Corp., Sharon, Pa.
14 Colorado Fuel & Iron Corp., Denver
15 Wheeling Steel Corp., Wheeling, W. Va.
16 Geneva Steel Co., Salt Lake City
17 Crucible Steel Co. of America, New York
18 Pittsburgh Steel Co., Pittsburgh
19 Kaiser Co., Inc., Oakland, Calif.
20 Portsmouth Steel Corp., Portsmouth, Ohio
21 Lukens Steel Co., Coatesville, Pa.
22 Granite City Steel Co., Granite City, Ill.
23 Wisconsin Steel Co., South Chicago, Ill.
24 Columbia Steel Co., San Francisco
25 Copperweld Steel Co., Glassport, Pa.
26 Alan Wood Steel Co., Conshohocken, Pa.
27 Midvale Co., Philadelphia
28 Allegheny Ludlum Steel Corp., Pittsburgh
29 Worth Steel Co., Claymont, Del.
30 Continental Steel Corp., Kokomo, Ind.
31 Rotary Electric Steel Co., Detroit
32 Laclede Steel Co., St. Louis
33 Northwestern Steel & Wire Co., Sterling, Ill.
34 Keystone Steel & Wire Co., Peoria, Ill.
35 Central Iron & Steel Co., Harrisburg, Pa.
36 Carpenter Steel Co., Reading, Pa.
37 Eastern Stainless Steel Corp., Baltimore
38 Washington Steel Corp., Washington, Pa.
39 Jessop Steel Co., Washington, Pa.
40 Blair Strip Steel Co., New Castle, Pa.
41 Superior Steel Corp., Carnegie, Pa.
42 Timken Steel & Tube Div., Canton, Ohio
43 Babcock & Wilcox Tube Co., Beaver Falls, Pa.
44 American Chain & Cable Co., Inc., New York
45 John A. Roebling's Sons Co., Trenton, N. J.
46 Simonds Saw & Steel Co., Fitchburg, Mass.
47 McLouth Steel Corp., Detroit
48 Cold Metal Products Co., Youngstown
49 Thomas Steel Co., Warren, Ohio
50 Wilson Steel & Wire Co., Chicago
51 Sweet's Steel Co., Williamsport, Pa.
52. Superior Drawn Steel Co., Monaca, Pa.
53 A. M. Byers Co., Pittsburgh
54 Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
55 Ingersoll Steel Div., Chicago
56 Latrobe Electric Steel Co., Latrobe, Pa.
57 Fitzsimons Steel Co., Youngstown
58 Stanley Works, New Britain, Conn.
59 Universal-Cyclops Steel Corp., Bridgeville, Pa.
60 Vanadium-Alloys Steel Co., Latrobe, Pa.
61 Cuyahoga Steel & Wire Co., Cleveland
62 Bethlehem Pacific Coast Steel Corp., San Francisco
63 Follansbee Steel Corp., Pittsburgh
64 Niles Rolling Mill Co., Niles, Ohio
65 Atlantic Steel Co., Atlanta
66 Acme Steel Co., Chicago
67 Joslyn Mfg. & Supply Co., Chicago
68 Detroit Steel Corp., Detroit
69 Wyckoff Steel Co., Pittsburgh
70 Bliss & Laughlin, Inc., Harvey, Ill.
71 Columbia Steel & Shafting Co., Pittsburgh
72 Cumberland Steel Co., Cumberland, Md.
73 La Salle Steel Co., Chicago
74 Monarch Steel Co., Inc., Indianapolis
75 Empire Steel Co., Mansfield, Ohio
76 Mahoning Valley Steel Co., Niles, Ohio
77 Oliver Iron & Steel Co., Pittsburgh
78 Pittsburgh Screw & Bolt Co., Pittsburgh
79 Standard Forgings Corp., Chicago
80 Driver Harris Co., Harrison, N. J.
81 Detroit Tube & Steel Div., Detroit
82 Reliance Div., Eaton Mfg. Co., Massillon, Ohio
83 Sheffield Steel Corp., Kansas City

MERCHANT WIRE PRODUCTS

To the dealer, f.o.b. mill

	Base Column	Pittsburg, Calif.
Standard & coated nails*	103	122
Woven wire fence†	109	132
Fence posts, carloads††	112	...
Single loop bale ties	106	130
Galvanized barbed wire**	123	143
Twisted barbless wire	123	...

* Pgh., Chi., Duluth; Worcester, 6 columns higher; Houston, 8 columns higher; Kansas City, 12 Columns higher. † 15½ gage and heavier. ** On 80 rod spools, in carloads. †† Duluth, Joliet and Johnstown.

	Base per 100 lb	Pittsburg, Calif.
Annealed fence wire‡	$4.80	$5.75
Annealed, galv. fencing‡	5.25	6.20
Cut nails, carloads‡‡	6.75	...

‡ Add 30¢ at Worcester; 10¢ at Sparrows Pt.

‡‡ Less 20¢ to jobbers.

PRODUCING POINTS — *Standard, coated or galvanized nails, woven wire fence, bale ties, and barbed wire:* Alabama City, Ala., 4; Atlanta, 65; Aliquippa, Pa. (except bale ties), 5; Bartonville, Ill. (except bale ties), 34; Chicago, 4; Donora, Pa., 2; Duluth, 2; Fairfield, Ala., 11; Johnstown, Pa. (except bale ties), 3; Joliet, Ill., 2; Kokomo, Ind., 30; Minnequa, Colo., 14; Monessen, Pa. (except bale ties), 18; Pittsburg, Calif., 24; Portsmouth, Ohio, 20; Rankin, Pa. (except bale ties), 2; Sparrows Point (except woven fence), 3; Sterling, Ill., 33; San Francisco (except nails and woven fence), 14; Torrance, Calif. (nails only), 24; Worcester (nails only), 2; Houston (except bale ties), 83; Kansas City (except bale ties), 83.

Fence posts: Duluth, 2; Johnstown, Pa., 3; Joliet, Ill., 2; Minnequa, Colo., 14; Moline, Ill., 4; Williamsport, Pa., 51.

Cut nails: Wheeling, W. Va., 15; Conshohocken, Pa., 26.

CLAD STEEL

Base prices, cents per pound, f.o.b. mill

Stainless-carbon	Plate	Sheet
No. 304, 20 pct,		
Coatesville, Pa. (21)	*26.50	
Washgtn, Pa. (39)	*26.50	
Claymont, Del. (29)	*26.50	
Conshohocken, Pa. (26)		*22.50
New Castle, Ind. (55)	*26.50	*24.00
Nickel-carbon		
10 pct, Coatesville, (26)	27.50	
Inconel-carbon		
10 pct, Coatesville, (21)	36.00	
Monel-carbon		
10 pct, Coatesville, (21)	29.00	
No. 302 Stainless-copper-stainless, Carnegie, Pa. (41)		75.00
Aluminized steel sheets, hot dip, Butler, Pa., (7)		7.75

* Includes annealing and pickling, or sandblasting.

ELECTRICAL SHEETS

24 gage, HR cut lengths, f.o.b. mill

	Cents per lb
Armature	5.45
Electrical	5.95
Motor	6.70
Dynamo	7.50
Transformer 72	8.05
Transformer 65	8.60
Transformer 58	9.30
Transformer 52	10.10

PRODUCING POINTS—Beech Bottom, W. Va., 18; Brackenridge, Pa., 28; Follansbee, W. Va., 63; Granite City, Ill., 22; Indiana Harbor, Ind., 8; Mansfield, Ohio, 75; Niles, Ohio, 64, 76; Toronto, Ohio, 63; Vandergrift, Pa. 1; Warren, Ohio, 4; Zanesville, Ohio, 7.

Numbers after producing points correspond to steel producers. See key on previous page.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. mill Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

	Pct Off List
½ in. & smaller x 6 in. & shorter	35
9/16 & ⅝ in. x 6 in. & shorter	37
¾ in. & larger x 6 in. shorter	34
All diam., longer than 6 in.	30
Lag, all diam over 6 in. & longer	35
Lag, all diam x 6 in. & shorter	37
Plow bolts	47

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	35
9/16 to 1 in. inclusive	34
1⅛ to 1½ in. inclusive	32
1⅝ in. and larger	27

On above bolts and nuts, excepting plow bolts, additional allowances of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifinished Hexagon Nuts

	USS	SAE
7/16 in. and smaller	..	41
½ in. and smaller	38	..
½ in. through 1 in.	..	39
9/16 in. through 1 in.	37	..
1⅛ in. through 1½ in.	35	37
1⅝ in. and larger	28	..

In full case lots, 15 pct additional discount.

Stove Bolts

Packages, nuts separate	$61.75
In bulk	70.00

Large Rivets

(½ in. and larger)

	Base per 100 lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$6.75
F.o.b. Lebanon, Pa.	6.75

Small Rivets

(7/16 in. and smaller)

	Pct off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	48

Cap and Set Screws

(In packages)	Pct Off List
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	46
¾ to 1 in. x 6 in., SAE (1035), heat treated	35
Milled studs	19
Flat head cap screws, listed sizes	5
Fillister head cap, listed sizes	28

C-R SPRING STEEL

Base per pound f.o.b. mill

0.26 to 0.40 carbon	4.00¢
0.41 to 0.60 carbon	5.50¢
0.61 to 0.80 carbon	6.10¢
0.81 to 1.05 carbon	8.05¢
1.06 to 1.35 carbon	10.35¢

Worcester, add 0.30¢.

LAKE SUPERIOR ORES

(51.50% Fe; natural content, delivered lower lake ports)

	Per gross ton
Old range, bessemer	$7.60
Old range, nonbessemer	7.45
Mesabi, bessemer	7.35
Mesabi, nonbessemer	7.20
High phosphorus	7.20

After Dec. 31, 1948, increases or decreases in Upper Lake freight, dock and handling charges and taxes thereon to be for the buyers' account.

RAILS, TRACK SUPPLIES

F.o.b. mill

Standard rails, 100 lb and heavier, No. 1 quality, per 100 lb	$3.20
Joint bars, per 100 lb	4.25
Light rails per 100 lb	3.55

	Base Price cents per lb
Track spikes†	5.35
Axles	5.20
Screw spikes	8.00
Tie plates	4.05
Tie plates, Pittsburgh, Torr., Calif.*	4.20
Track bolts, untreated	8.25
Track bolts, heat treated, to railroads	8.50

*Seattle, add 30¢.

†Kansas City, 5.60¢.

PRODUCING POINTS—*Standard rails:* Bessemer, Pa., 1; Ensley, Ala., 11; Gary, 1; Indiana Harbor, Ind., 8; Lackawanna, N. Y., 3; Minnequa, Colo., 14; Steelton, Pa., 3.

Light rails: All the above except Indiana Harbor and Steelton, plus Fairfield, Ala., 11; Johnstown, Pa. 3; Minnequa, Colo., 14.

Joint bars: Bessemer, Pa., 1; Fairfield, Ala., 11; Indiana Harbor, Ind., 8; Joliet, Ill., 1; Lackawanna, N. Y., 3; Steelton, Pa., 3; Minnequa, Colo., 14.

Track spikes: Fairfield, Ala., 11; Indiana Harbor, Ind., 6, 8; Lebanon, Pa., 3; Minnequa, Colo., 14; Pittsburgh, 5; Chicago, 4; Struthers, Ohio, 6; Youngstown, 4.

Track bolts: Fairfield, Ala., 11; Lebanon, Pa., 3; Minnequa, Colo., 14; Pittsburgh, 77, 78.

Axles: Fairfield, Ala., 11; Gary, 1; Indiana Harbor, Ind., 79; Johnstown, Pa., 3; McKees Rocks, Pa., 1.

Tie plates: Fairfield, Ala., 11; Gary, 1; Indiana Harbor, Ind., 8; Lackawanna, N. Y., 3; Pittsburg, Calif., 24; Pittsburgh, 4; Seattle, 62; Steelton, Pa., 3; Torrance, Calif., 24; Minnequa, Colo., 14.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	90.5¢
18	4	1	—	5	$1.43
18	4	2	—	—	$1.035
1.5	4	1.5	8	—	65¢
6	4	2	6	—	69.5¢

High-carbon-chromium	52¢
Oil hardened manganese	29¢
Special carbon	26.5¢
Extra carbon	23¢
Regular carbon	19¢

Warehouse prices on and east of Mississippi are 2½¢ per lb higher. West of Mississippi, 4½¢ higher.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	$14.00 to $14.50
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	$15.50 to $16.00
Foundry, oven coke	
Buffalo, del'd	$20.90
Chicago, f.o.b.	20.40
Detroit, f.o.b.	19.40
New England, del'd	22.70
Seaboard, N. J., f.o.b.	22.00
Philadelphia, f.o.b.	20.45
Swedeland, Pa., f.o.b.	20.40
Plainesville, Ohio, f.o.b.	20.90
Erie, del'd	$20.25 to 21.04
Cleveland, del'd	22.62
Cincinnati, del'd	21.71
St. Paul, f.o.b.	23.50
St. Louis, del'd.	21.60
Birmingham, del'd	18.75

FLUORSPAR

Washed gravel fluorspar, f.o.b. cars, Rosiclare, Ill. Base price, per ton net: Effective CaF, content:

70% or more	$37.00
60% or less	34.00

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STAINLESS STEELS

Base prices, in cents per pound, f.o.b. producing point

Product	301	302	303	304	316	321	347	410	416	430
Ingots, rerolling	12.75	13.50	15.00	14.50	22.75	18.25	20.00	11.25	13.75	11.50
Slabs, billets, rerolling	17.00	18.25	20.25	19.25	30.25	24.50	26.75	15.00	18.50	15.25
Forg. discs, die blocks, rings	30.50	30.50	33.00	32.00	49.00	36.50	41.00	24.50	25.00	25.00
Billets, forging	24.25	24.25	26.25	25.50	39.00	29.00	32.75	19.50	20.00	20.00
Bars, wire, structurals	28.50	28.50	31.00	30.00	46.00	34.00	38.50	23.00	23.50	23.50
Plates	32.00	32.00	34.00	34.00	50.50	39.50	44.00	26.00	26.50-27.00	26.50
Sheets	37.50	37.50	39.50	39.50	53.00	45.50	50.00	33.00	33.50	35.50
Strip, hot-rolled	24.25	25.75	30.00	27.75	46.00	34.50	38.75	21.25	28.00	21.75
Strip, cold-rolled	30.50	33.00	36.50	36.00	55.00	44.50	48.50	27.00	33.50	27.50

Numbers correspond to producers. See Key on Steel Price Page.

STAINLESS STEEL PRODUCING POINTS—*Sheets:* Midland, Pa., 17; Brackenridge, Pa., 28; Butler, Pa., 7; McKeesport, Pa., 1; Washington, Pa., 38, 39; Baltimore, 37; Middletown, Ohio, 7; Massillon, Ohio, 4; Gary, 1; Bridgeville, Pa., 59; New Castle, Ind., 55; Lockport, N. Y., 46.

Strip: Midland, Pa., 17; Cleveland, 2; Carnegie, Pa., 41; McKeesport, Pa., 54; Reading, Pa., 36; Washington, Pa., 38; W. Leechburg, Pa., 28; Bridgeville, Pa., 59; Detroit, 47; Massillon, Canton, Ohio, 4; Middletown, Ohio, 7; Harrison, N. J., 49; Youngstown, 48; Lockport, N. Y., 46; New Britain, Conn., 58; Sharon, 13; Butler, Pa., 7.

Bars: Baltimore, 7; Duquesne, Pa., 1; Munhall, Pa., 1; Reading, Pa., 36; Titusville, Pa., 59; Washington, Pa., 39; McKeesport Pa., 1, 54; Bridgeville, Pa., 59; Dunkirk, N. Y., 28; Massillon, Ohio, 4; Chicago 1, 67; Syracuse, N. Y., 17; Watervliet, N. Y., 28; Waukegan, Ill., 2; Lockport, N. Y., 46; Canton, Ohio, 42.

Wire: Waukegan, Ill., 2; Massillon, Ohio, 4; McKeesport, Pa., 54; Bridgeport, Conn., 44; Chicago, 67; Trenton, N. J., 45; Harrison N. J., 80; Baltimore, 7; Dunkirk, 28.

Structurals: Baltimore, 7; Massillon, Ohio, 4; Chicago, 1, 67; Watervliet, N. Y., 28; Bridgeport, Conn., 44.

Plates: Brackenridge, Pa., 28; Butler, Pa., 7; Chicago, 1; Munhall, Pa., 1; Midland, Pa., 17; New Castle, Ind., 55; Lockport, N. Y., 46; Middletown, 7; Washington, Pa., 39; Cleveland, Massillon, 4.

Forged discs, die blocks, rings: Pittsburgh, 1, 17; Syracuse, 17; Ferndale, Mich., 28.

Forging billets: Midland, Pa., 17; Baltimore, 7; Washington, Pa., 39; McKeesport, 54; Massillon, Canton, Ohio, 4; Watervliet, 28; Pittsburgh, Chicago, 1.

REFRACTORIES (*F.o.b. works*)

Fire Clay Brick *Carloads, Per 1000*

First quality, Pa., Ky., Mo., Ill. (except Salina, Pa., add $5) $80.00
No. 1 Ohio 74.00
Sec. quality, Pa., Md., Ky., Mo., Ill. 74.00
No. 2 Ohio 66.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50) 11.50

Silica Brick

Mt. Union, Pa., Ensley, Ala. $80.00
Childs, Pa. 84.00
Hays, Pa. 85.00
Chicago District 89.00
Western, Utah and Calif. 95.00
Super Duty, Hays, Pa., Athens, Tex. ..... $85.00 to 95.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.) .. $13.75 to 14.00
Silica cement, net ton, bulk, Hays, Pa. 16.00
Silica cement, net ton, bulk, Ensley, Ala. 15.00
Silica cement, net ton, bulk, Chicago District ..... $14.75 to 15.00
Silica cement, net ton, bulk, Utah and Calif. 21.00

Chrome Brick *Per Net Ton*

Standard chemically bonded, Balt., Chester $69.00

Magnesite Brick

Standard, Balt. and Chester $91.00
Chemically bonded, Balt. and Chester 80.00

Grain Magnesite *Std. ⅜-in. grains*

Domestic, f.o.b. Balt. and Chester, in bulk, fines removed .... $56.00 to 56.50
Domestic, f.o.b. Chewelah, Wash., in bulk with fines ..... $30.50 to 31.00
in sacks with fines ..... 35.00 to 35.50

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk, Midwest, add 10¢; Missouri Valley, add 20¢ $12.25

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags .... 7.4¢ to 9.0¢
Domestic sponge iron, 98+% Fe, carload lots ..... 9.0¢ to 15.0¢
Electrolytic iron, annealed, 99.5+% Fe ..... 31.5¢ to 39.5¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe ..... 48.5¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe .. 63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 microns, 98%, 99.8+% Fe 90.0¢ to $1.75
Aluminum ..... 29.00¢
Antimony ..... 45.78¢
Brass, 10 ton lots ..... 22.75¢ to 25.75¢
Copper, electrolytic ..... 28.625¢
Copper, reduced ..... 28.50¢
Cadmium $2.40
Chromium, electrolytic, 99% min. $3.50
Lead ..... 19.92¢
Manganese ..... 55.00¢
Molybdenum, 99% $2.65
Nickel, unannealed ..... 61.00¢
Nickel, spherical, minus 30 mesh, unannealed ..... 68.00¢
Silicon ..... 34.00¢
Solder powder ..... 8.5¢ plus metal cost
Stainless steel, 302 ..... 75.00¢
Tin $1.06
Tungsten, 99% $2.90
Zinc, 10 ton lots ..... 15.50¢ to 18.25¢

ELECTRODES

Cents per lb, f.o.b. plant, threaded electrodes with nipples, unboxed

Diam. in in.	Length in in.	Cents Per lb
	GRAPHITE	
17, 18, 20	60, 72	16.00¢
8 to 16	48, 60, 72	16.50¢
7	48, 60	17.75¢
6	48, 60	19.00¢
4, 5	40	19.50¢
3	40	20.50¢
2½	24, 30	21.00¢
2	24, 30	23.00¢
	CARBON	
40	100, 110	7.50¢
35	65, 110	7.50¢
30	65, 84, 110	7.50¢
24	72 to 104	7.50¢
17 to 20	84, 90	7.50¢
14	60, 72	8.00¢
10, 12	60	8.25¢
8	60	8.50¢

PIPE AND TUBING

Base discounts, f.o.b. mills
Base price, about $200.00 per net ton

Standard, Threaded and Coupled

Steel, buttweld*	Black	Galv
½-in.	43 to 41	26½ to 24½
¾-in.	46 to 44	30½ to 28½
1-in.	48½ to 46½	33½ to 31½
1¼-in.	49 to 47	34 to 32
1½-in.	49½ to 47½	34½ to 32½
2-in.	50 to 48	35 to 33
2½ to 3-in.	50½ to 48½	35½ to 33½

Steel, lapweld		
2-in.	39½	26 to 24
2½ to 3-in.	43½ to 42½	28 to 27
3½ to 6-in.	46½ to 42½	31 to 27

Steel, seamless		
2-in.	38½	23
2½ to 3-in.	41½	26
3½ to 6-in.	43½	28

Wrought Iron, buttweld		
½-in.	+20½	+47
¾-in.	+10½	+36
1 & 1¼ in.	+ 4½	+27
2-in.	— 1½	+23½
3-in.	— 2	+23

Wrought Iron, lapweld		
2-in.	+ 7½	+31
2½ to 3½-in.	+ 5	+26½
4-in.	list	+20½
4½ to 8-in.	+ 2	+22

Extra Strong, Plain Ends

Steel, buttweld		
½-in.	42 to 40	27 to 25
¾-in.	46 to 44	31 to 29
1-in.	48 to 46	34 to 32
1¼-in.	48½ to 46½	34½ to 32½
1½-in.	49 to 47	35 to 33
2-in.	49½ to 47½	35½ to 34½
2½ to 3-in.	50 to 48	36 to 34

Steel, lapweld		
2-in.	39½ to 38½	25 to 24
2½ to 3-in.	44½ to 42½	30 to 28
3½ to 6-in.	48 to 44	33½ to 31½

Steel, seamless		
2-in.	37½	23
2½ to 3-in.	41½	27
3½ to 6-in.	45	30½

Wrought Iron, buttweld		
½-in.	+16	+40
¾-in.	+ 9½	+34
1 to 2-in.	— 1½	+23

Wrought Iron, lapweld		
2-in.	+ 4½	+27½
2½ to 4-in.	— 5	+16
4½ to 6-in.	— 1	+20½

For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct.
*Fontana, Calif., deduct 11 points from figures in left columns.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Prices per 100 ft at mill in carload lots, cut length 4 to 24 ft inclusive.

OD in in.	Gage BWG	Seamless H.R.	Seamless C.R.	Electric Weld H.R.	Electric Weld C.D.
2	13	$19.18	$22.56	$18.60	$21.89
2½	12	25.79	30.33	25.02	29.41
3	12	28.68	33.76	27.82	32.74
3½	11	35.85	42.20	34.78	40.94
4	10	44.51	52.35	43.17	50.78

CAST IRON WATER PIPE

Per net ton

6 to 24-in., del'd Chicago $95.70
6 to 24-in., del'd N. Y. ..... $92.50 to 97.40
6 to 24-in., Birmingham 82.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipment; rail and water shipment less 109.30
Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

WAREHOUSE PRICES

Base prices, f.o.b. warehouse, dollars per 100 lb.
(Metropolitan area delivery, add 15c to base price except Cincinnati and New Orleans (*), add 10c; New York, Chicago and Boston, add 20c.)

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Baltimore	5.31	6.21-6.41	6.95-7.11	5.37	....	5.56	5.36	5.42	6.16	....	9.60-10.10	....	....
Birmingham	4.85	5.75	6.15	4.85	....	5.10	4.90	4.90	6.59	....	....	....	....
Boston	5.55	6.45-6.75	7.11-7.61	5.60	6.75	5.75	5.42	5.52	6.02	9.36-9.67	9.67-9.87	10.72	11.02
Buffalo	4.85	5.75	7.42-7.57	5.24	7.27	5.35	5.00	4.95	5.40	9.30	9.60	10.65	10.95
Chicago	4.85	5.75	6.85	4.85	5.45-6.15	5.10	4.90	4.90	5.40	8.90	9.20	10.25	10.55
Cincinnati*	5.16-5.51	5.84-6.28	6.59-6.93	5.28-5.43	....	5.53-5.85	5.33	5.33-5.48	6.08-6.20	9.74	9.99	11.19	11.44
Cleveland	4.85	5.75	6.70	5.03	....	5.21	5.01	5.01	5.45	9.05	9.35	10.40	10.70
Detroit	5.28-5.32	6.07-6.18	7.38-7.56	5.27-5.47	6.27-6.58	5.52-5.57	5.33-5.40	5.33-5.55	6.00-6.16	9.67	9.92	11.11	11.35
Houston	6.70-6.95	....	7.30	6.70	....	6.70	6.20-6.70	6.40-6.65	7.60	10.45	10.40	11.45	11.70
Indianapolis	5.29	6.13	7.44	5.29	7.36	5.54	5.34	5.34	6.14	11.25	11.39	....	....
Kansas City	5.50	6.40	7.80	5.50	6.95[5]	5.75	5.55	5.55	6.10	9.55	9.85	10.90	11.20
Los Angeles	5.45	7.00	7.45	5.95	7.35[30]	5.50	5.45	5.60	7.25	....	....	....	....
Memphis	5.75-5.80	6.60	7.20	5.80-5.95	6.80	5.95-6.00	5.75	5.75	6.53	....	....	....	....
Milwaukee	5.03	5.93	7.02	5.03-5.38	6.32	5.28	5.08	5.08	5.63	9.08	9.38	10.43	10.73
New Orleans*	5.95	6.75	....	6.15	....	6.15	5.95	5.95	6.65[6]	....	....	....	....
New York	5.40	6.31	6.85-6.90	5.82	6.76	5.65	5.33	5.57	6.31	9.28	9.58	10.63	10.93
Norfolk	6.00	....	....	6.20	....	6.05	6.05	6.05	7.05	....	....	....	....
Omaha	6.13	....	8.33	6.13	....	6.38	6.18	6.18	6.98	....	....	....	....
Philadelphia	4.95	6.24[13]	6.63	5.40	6.29	5.35	5.10	5.40	5.96	9.05	9.35	10.62	10.87
Pittsburgh	4.85	5.75	6.90	5.00	6.00	5.05	4.90	4.90	5.40	8.90	9.20	10.25	10.55
Portland	6.50[8]-7.05	8.00	8.80-9.10	6.85[8]	....	6.30[8]	6.35[8]	6.35[8]	8.25[14]	10.50[8]	10.10[8]	....	....
Salt Lake City	7.05	7.05	8.65	7.45[3]	....	5.65[3]	5.50[3]	7.10[8]	8.15	....	....	....	....
San Francisco	6.15[8]	7.50[2]	8.65-7.80	6.75[8]	8.25[8]	6.35[8]	5.90[8]	5.90[8]	7.55	9.80	10.00	11.20	11.60
Seattle	6.70[4]-7.10	8.15[2]-8.65	8.80-9.30	6.70[4]	....	6.35[4]	6.30[4]	6.20[4]	8.15[14]	....	10.35[15]	....	13.10[15]
St. Louis	5.22-5.37	6.12-6.27	7.32	5.22	6.68-7.54	5.47	5.27	5.27	5.82	9.27-9.72	9.57-9.97	10.62-11.17	10.92-11.42
St. Paul	5.44	6.19-6.34	7.54-7.64	5.44	6.82	5.64-6.69	5.49	5.49	6.04	9.49	9.79	10.84	11.14

BASE QUANTITIES *Standard unless otherwise keyed on prices.*

Hot-Rolled:
Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

Cold-Rolled:
Sheets. 400 to 1499 lb strip, extras on all quantities. Bars 1000 lb and over.

Alloy Bars:
1000 to 1999 lb.

Galvanized Sheets:
450 to 1499 lb.

Exceptions:
(1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb; (18) 1000 to 1499 lb; (19) 1500 to 3499 lb; (20) 6000 lb and over.

PIG IRON PRICES

Dollars per gross ton. Delivered prices do not include 3 pct tax on freight.

PRODUCING POINT PRICES

Producing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	48.00	48.50	49.00	49.50	.....
Birmingham	38.88	39.38	.....	.....	.....
Buffalo	46.00	46.50	47.00	.....	.....
Chicago	46.00	46.50	46.50	47.00	.....
Cleveland	46.00	46.50	46.50	47.00	51.00
Duluth	46.00	46.50	46.50	47.00	.....
Erie	46.00	46.50	46.50	47.00	.....
Everett	....	50.50	51.00	.....	.....
Granite City	47.90	48.40	48.90	.....	.....
Ironton, Utah	46.00	46.50	....	....	.....
Pittsburgh	46.00	46.50	46.50	47.00	.....
Geneva, Utah	46.00	46.50	.....	.....	.....
Sharpsville	46.00	46.50	46.50	47.00	.....
Steelton	48.00	48.50	49.00	49.50	54.00
Struthers, Ohio	46.00	....	....	....	.....
Swedeland	48.00	48.50	49.00	49.50	.....
Toledo	46.00	46.50	46.50	47.00	.....
Troy, N. Y.	48.00	48.50	49.00	....	54.00
Youngstown	46.00	46.50	46.50	47.00	.....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Producing Point	Rail Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	.....	50.50	51.00	.....	.....
Boston	Steelton	6.90	.....	.....	.....	.....	60.90
Brooklyn	Bethlehem	4.29	.....	52.79	53.29	53.79	.....
Cincinnati	Birmingham	6.70	45.58	46.08	.....	.....	.....
Jersey City	Bethlehem	2.63	.....	51.13	51.63	52.13	.....
Los Angeles	Geneva-Ironton	7.70	53.70	54.20	.....	.....	.....
Mansfield	Cleveland-Toledo	3.33	49.33	49.83	49.83	50.33	54.33
Philadelphia	Bethlehem	2.39	50.39	50.89	51.39	51.89	.....
Philadelphia	Swedeland	1.44	49.44	49.94	50.44	50.94	.....
Philadelphia	Steelton	3.09	.....	.....	.....	.....	57.09
Rochester	Buffalo	2.63	48.63	49.13	49.63	.....	.....
San Francisco	Geneva-Ironton	7.70	53.70	54.20	.....	.....	.....
Seattle	Geneva-Ironton	7.70	53.70	54.20	.....	.....	.....
St. Louis	Granite City	0.75 Arb.	48.65	49.15	49.65	.....	.....
Syracuse	Buffalo	3.58	49.58	50.08	50.58	.....	.....

Producing point prices are subject to switching charges; silicon differential (not to exceed 50c per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct for foundry iron); phosphorus differentials, a reduction of 38c per ton for phosphorus content of 0.70 pct and over manganese differentials, a charge not to exceed 50c per ton for each 0.50 pct manganese content in excess of 1.00 pct, $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.01 to 6.50 pct. C/L per g.t., f.o.b. Jackson, Ohio—$59.50; f.o.b. Buffalo, $60.75. Add $1.00 per ton for each additional 0.50 pct Si up to 17 pct. Add 50c per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus $60.00 per gross ton, f.o.b. Lyle, Tenn. Delivered Chicago, $68.56. High phosphorus charcoal pig iron is not being produced.

UNIVERSITY OF MICHIGAN LIBRARIES

FERROALLOYS

Ferromanganese

78-82% Mn, Max'mum contract base price, gross ton, lump size.
F.o.b. Birmingham $174
F.o.b. Niagara Falls, Alloy, W. Va., Welland, Ont. $172
F.o.b. Johnstown, Pa. $174
F.o.b. Sheridan, Pa. $172
F.o.b. Etna, Clairton, Pa. $176
$2.00 for each 1% above 82% Mn, penalty, $2.15 for each 1% below 78%.
Briquets—Cents per pound of briquet, delivered, 66% contained Mn.
Carload, bulk 10.45
Ton lots 12.05
Less ton lots 12.95

Spiegeleisen

Contract prices gross ton, lump, f.o.b.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Palmerton, Pa.	$64.00	$65.00
Pgh. or Chicago	65.00	66.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.
96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.
Carload, packed 35.5
Ton lots 37.0

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.
Carloads 28
Ton lots 30
Less ton lots 32

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, delivered.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	25.25	27.10	28.30
0.10% max. C	24.75	26.60	27.80
0.15% max. C	24.25	26.10	27.30
0.30% max. C	23.75	25.60	26.80
0.50% max. C	23.25	25.10	26.30
0.75% max. C, 7.00% max. Si	20.25	22.10	23.30

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C. For 2% max. C, deduct 0.2¢.
Carload bulk 8.95
Ton lots 10.60
Briquet, contract basis carlots, bulk delivered, per lb of briquet 10.30
Ton lots 11.90
Less ton lots 12.80

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $77.00 gross ton, freight allowed to normal trade area; Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $73.50. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 for each 0.50% Mn over 1%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, for ton lots packed.
96% Si, 2% Fe 20.70
97% Si, 1% Fe 21.10

Silicon Briquets

Contract price, cents per pound of briquet, bulk, delivered, 40% Si, 1 lb Si briquets.
Carload, bulk 6.30
Ton lots 7.90
Less ton lots 8.80

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size, bulk, in carloads, delivered.
25% Si 17.00
50% Si 11.30
75% Si 13.50
85% Si 14.65
90-95% Si 16.50

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Ferrochrome

Contract prices, cents per pound, contained Cr, lump size, bulk, in carloads, delivered. (65-72% Cr, 2% max. Si)
0.06% C 28.75
0.10% C 28.25
0.15% C 28.00
0.20% C 27.75
0.50% C 27.50
1.00% C 27.25
2.00% C 27.00
65-69% Cr, 4-9% C 20.50
62-66% Cr, 4-6% C, 6-9% Si 21.35
Briquets — Contract price, cents per pound of briquet, delivered, 60% chromium.
Carload bulk 13.75
Ton lots 15.25
Less ton lots 16.15

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, delivered.
High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.
Carloads 21.60
Ton lots 23.75
Less ton lots 25.25
Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.
Carloads 27.75
Ton lots 30.05
Less ton lots 31.85

Chromium Metal

Contract prices, per lb chromium contained packed, delivered, ton lots. 97% min. Cr, 1% max. Fe.
0.20% max. C $1.09
0.50% max. C 1.05
9.00% min. C 1.04

Calcium-Silicon

Contract price per lb of alloy, lump, delivered.
30-33% Ca, 60-65% Si, 3.00% max. Fe.
Carloads 17.90
Ton lots 21.00
Less ton lots 22.50

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered.
16-20% Ca, 14-18% Mn, 53-59% Si.
Carloads 19.25
Ton lots 21.55
Less ton lots 22.55

CMSZ

Contract price, cents per pound of alloy, delivered.
Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.
Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.
Ton lots 19.75
Less ton lots 21.00

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis.. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.
Ton lots ..... 15.75¢
Less ton lots ..... 17.00¢

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.
Carload packed ..... 17.00¢
Ton lots to carload packed ..... 18.00¢
Less ton lots ..... 19.50¢

SMZ

Contract price, cents per pound of alloy, delivered. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ½ in. x 12 mesh.
Ton lots 17.25
Less ton lots 18.50

Other Ferroalloys

Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.
Carload ..... 7.40¢
Ton lots ..... 8.80¢
Calcium molybdate, 45-50%, f.o.b. Langeloth, Pa., per pound contained Mo. ..... 96¢
Ferrocolumbium, 50-60% contract basis, delivered, per pound contained Cb.
Ton lots $2.90
Less ton lots 2.95
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo. $1.10
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton $65.00
10 tons to less carload 75.00
Ferrotitanium, 40%, regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed east of Mississippi and north of Baltimore, ton lots, per lb contained Ti..... $1.25
Ferrotitanium, 25%, low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed east of Mississippi and north of Baltimore, ton lots, per lb contained Ti..... $1.40
Less ton lots..... 1.45
Ferrotitanium, 15 to 19%, high carbon, f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, carloads per net ton $160.00
Ferrotungsten, standard, lump or ¼ x down, packed, per pound contained W, 5 ton lots, delivered $2.25
Ferrovanadium, 35-55%, contract basis, delivered, per pound, contained, V.
Openhearth $2.90
Crucible 3.00
High speed steel (Primos)... 3.10
Molybdenum oxide briquets, f.o.b. Langeloth, Pa.; bags, f.o.b. Wash., Pa., per lb contained Mo. 95¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound
Carload, bulk, lump ..... 11.00¢
Ton lots, bulk, lump ..... 11.50¢
Ton lots, packed, lump ..... 11.75¢
Less ton lots, lump ..... 12.25¢
Vanadium pentoxide, 88-92% V_2O_5 contract basis, per pound contained V_2O_5 ..... $1.20
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.
Ton lots ..... 21.00¢
Zirconium, 12-15%, contract basis, lump, delivered, per lb of alloy.
Carload, bulk ..... 6.60¢

Boron Agents

Contract prices, per lb of alloy, del.
Borosil, f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B $4.25
Bortam, f.o.b. Niagara Falls
Ton lots, per pound ..... 45¢
Less ton lots, per pound ..... 50¢
Carbortam, f.o.b. Suspension Bridge, N. Y.; freight allowed, Ti 15-18%, B 1.00-1.50%, Si 2.5-3.0%, Al 1.0-2.0%.
Ton lots, per pound ..... 8.625¢
Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D. Ton lots $1.20
F.o.b. Wash., Pa.; 100 lb and over
10 to 14% B. ..... .75
14 to 19% B. 1.20
19% min. B. 1.50
Grainal, f.o.b. Bridgeville, Pa. freight allowed, 100 lb and over.
No. 1 ..... 93¢
No. 6 ..... 63¢
No. 79 ..... 45¢
Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, delivered.
Ton lots $1.67
Less ton lots 1.79
Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered.
Less ton lots $1.80
Silcaz, contract basis, delivered
Ton lots ..... 45.00¢

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Iron Age Introduces

Continued from Page 25

Russell G. Davis is a newly appointed sales executive of CHAIN BELT CO., Milwaukee.

W. M. COWLES, sales vice-president, Superior Steel Corp.

William M. Cowles was elected sales vice-president of SUPERIOR STEEL CORP., Pittsburgh. Mr. Cowles has been Superior's general sales manager since 1941.

A. C. Traub has been appointed manager of the Stoker Div. of FAIRBANKS, MORSE & CO., Chicago, succeeding **F. J. Kluempers** who has been transferred to the General Dealer Sales Div. **Harold D. Gobble** has been appointed manager of the Dallas branch house, succeeding **Harry J. Renken** who has been transferred to the company's headquarters in Chicago to become Oil Field Div. manager. **Russell A. Stevens** has been named manager of the Boston branch house, succeeding **V. O. Harkness** who has assumed the duties of diesel sales department manager for the Boston area.

Richard Cutts, Jr., has been named manager of sales for the Central Station Divs. of GENERAL ELECTRIC CO., Schenectady. **E. N. Chilberg**, **R. R. Owen**, **J. W. Dodge** and **L. B. Proctor** have been elected managers of sales for different sections of the Central Station Divs., Mr. Chilberg heading the eastern section, Mr. Owen, western section, Mr. Dodge,

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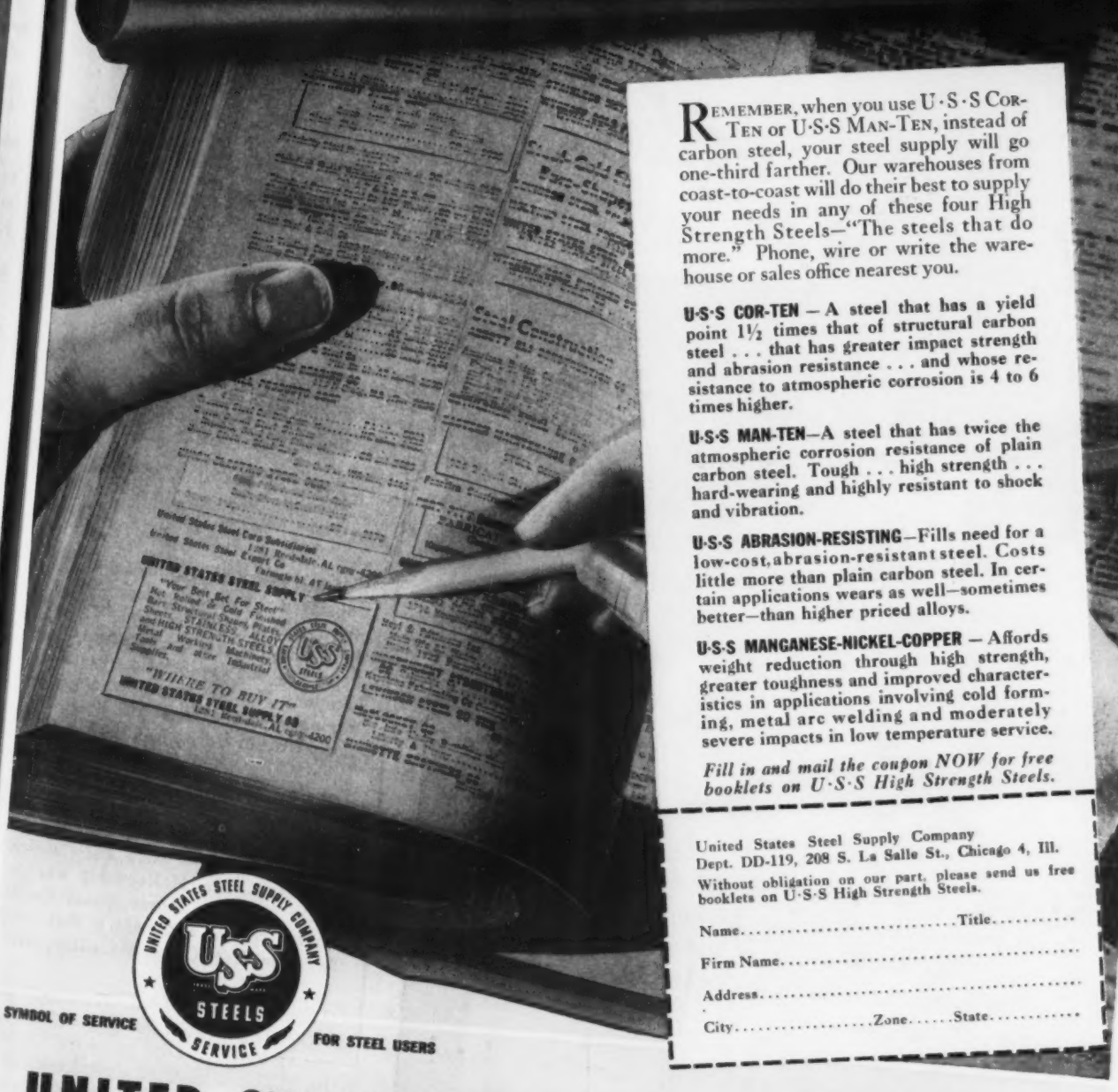

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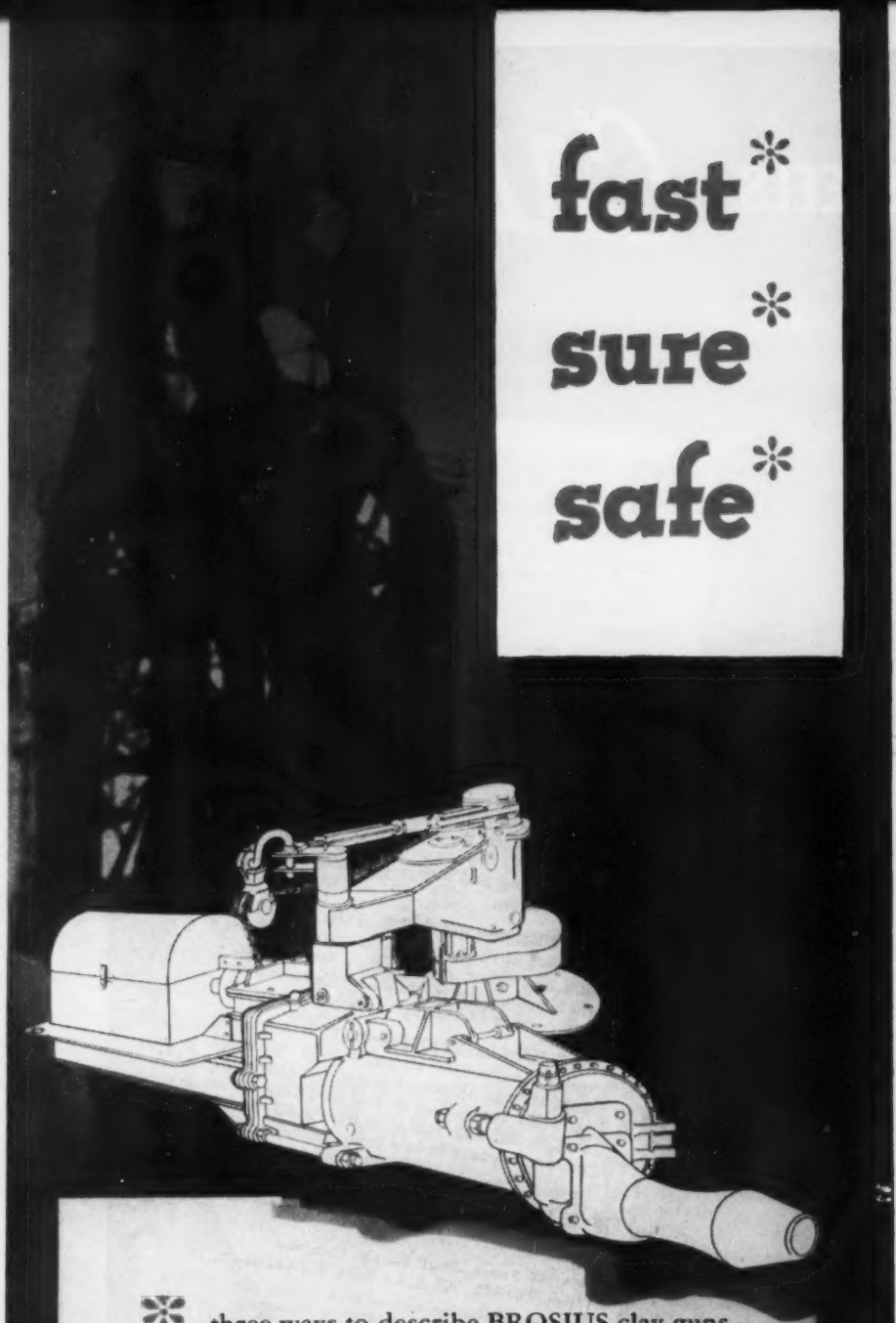

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IRON AGE INTRODUCES

Continued

government section, and Mr. Proctor, rural electrification administration section. **C. W. Bryant** has been appointed purchasing agent of the purchasing department's Ferrous Products Div., succeeding **Arelin L. Wagoner** who will continue work of an advisory capacity.

MILO F. McCAMMON, general manager, Stamford Div., Yale & Towne Mfg. Co.

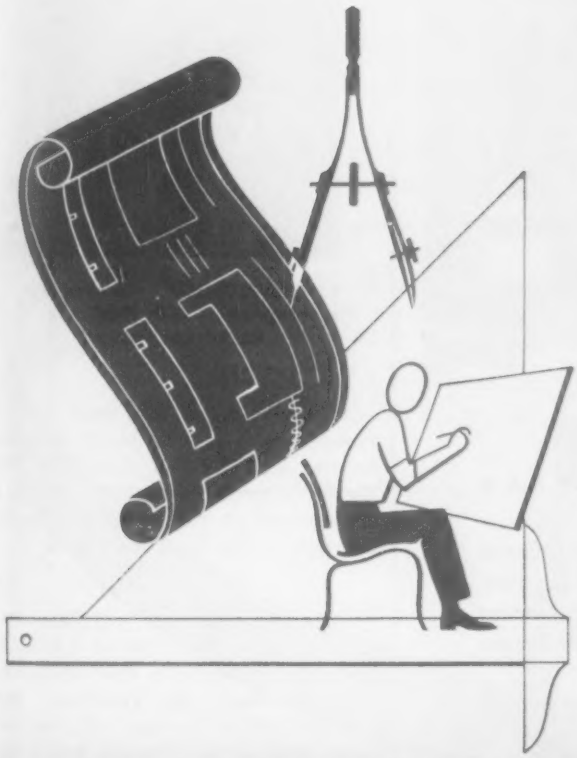
Milo Franklin McCammon has been appointed general manager of the Stamford division of the YALE & TOWNE MFG. CO., Stamford, Conn. Prior to his association with the company Mr. McCammon was general manager of the Ingersoll Steel Div., Borg-Warner Corp., Kalamazoo, Mich.

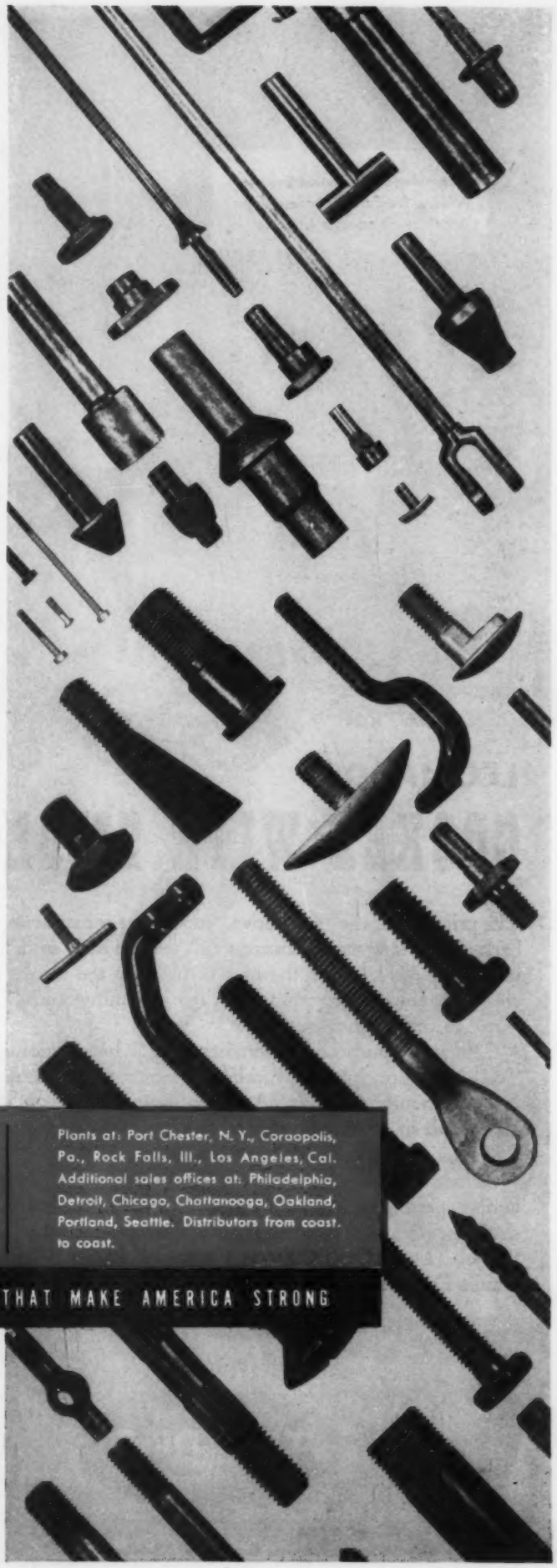
E. L. McReynolds has been appointed sales engineer of SHARON STEEL CORP., Sharon, Pa., specializing in the sale of alloy and stainless steel strip. Mr. McReynolds was recently with the Morse Chain Co. at Ithaca, N. Y., and before that with Republic Steel Corp., Massillon, Ohio.

William J. Grant has been appointed manager southern sales for the National Bearing Div. of AMERICAN BRAKE SHOE CO., New York. Mr. Grant, formerly sales representative for the company's Brake Shoe & Castings and Southern Wheel Divs., has been with Brake Shoe since 1940. He will make his headquarters in Richmond, Va.

Raymond C. Stoelting has been appointed Indiana representative of the READY TOOL CO., Bridgeport, Conn.

ENGINEERING ASSISTANCE ON SPECIAL FASTENER PROBLEMS may help you lower costs—provide *True Fastener Economy*. Contact RB&W for **SPECIAL DESIGNS, SPECIAL METALS, SPECIAL FINISHES,** and you will have at your disposal the "know-how" of 104 years of fastener experience and a wide variety of manufacturing facilities.





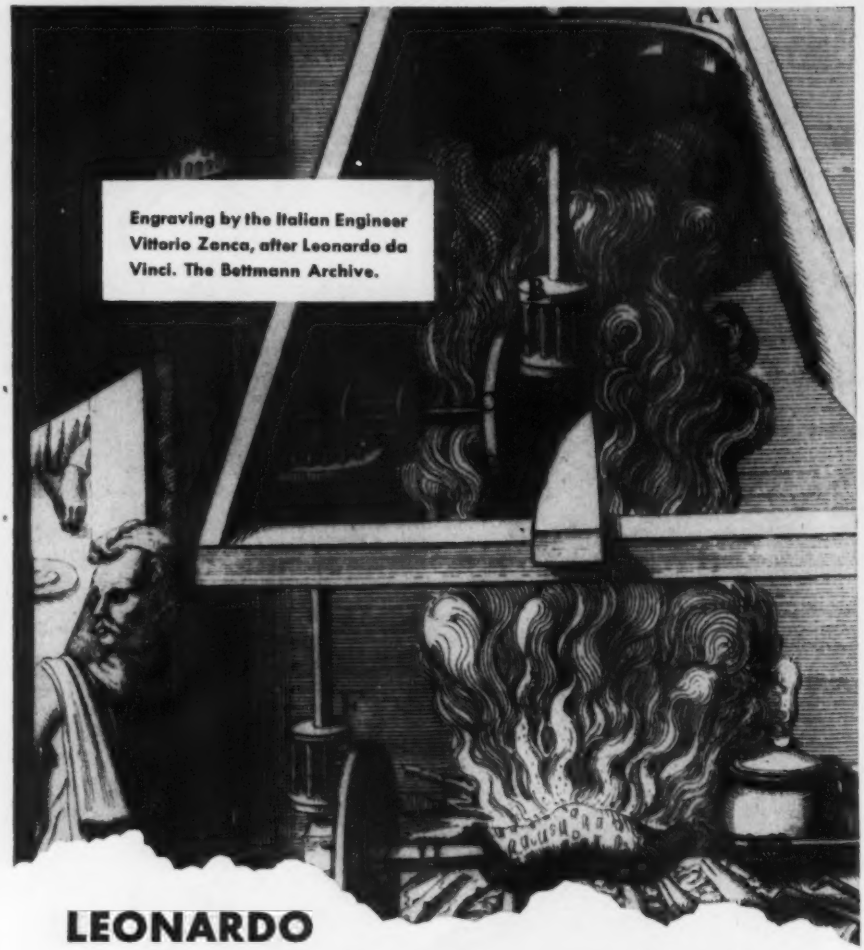
RB & W

THE COMPLETE QUALITY LINE

Plants at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill., Los Angeles, Cal. Additional sales offices at: Philadelphia, Detroit, Chicago, Chattanooga, Oakland, Portland, Seattle. Distributors from coast to coast.

104 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY



Engraving by the Italian Engineer Vittorio Zonca, after Leonardo da Vinci. The Bettmann Archive.

LEONARDO

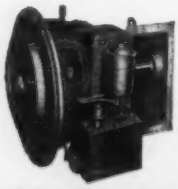
COOKED WITH SMOKE...

The principle of the "fluid drive," modern as it may seem to be, goes back a long, long way. Leonardo da Vinci, an early student of power transmission, conceived the idea of utilizing the smoke and steam created by the cooking process to drive a primitive turbine and cause a spit to revolve automatically.

Leonardo's purpose was commendable... his solution impractical. Today, the principle of hydraulic power transmission continues to intrigue inquiring minds. And the Twin Disc Clutch Company takes pride in providing practical answers to the power transmission problems of leading equipment manufacturers.

Wherever power must be applied... in all types of construction, lumber, petroleum and farm equipment and in the marine and machine tool fields... there is a Twin Disc product that will handle the job. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

Hydraulic Torque Converter



TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

Hydraulic Coupling

SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

IRON AGE INTRODUCES

Continued

E. R. Babylon, sales metallurgist for KAISER STEEL CORP., Oakland, Calif., has been transferred from Los Angeles to the Oakland Offices of the company to promote the sale of Kaisaloy, the new light weight, low-alloy steel recently announced.

A. T. WAIDELICH, vice-president in charge of research, Austin Co.

A. T. Waidelich has been elected vice-president in charge of research for the AUSTIN CO., Cleveland. Mr. Waidelich has been assistant director of research at the company's headquarters in Cleveland since 1941.

Glenn H. Edgecomb has been appointed works manager of JACK & HEINTZ PRECISION INDUSTRIES, INC., Cleveland. Mr. Edgecomb was formerly works manager of Holtzer-Cabot Electric Co., Boston, and prior to that occupied for several years a similar position with the Sonatone Corp., Elmsford, N. Y.

Edward F. Everett, Jr., has been named senior process engineer in the engineering department of the HOUDRY PROCESS CORP., Wilmington, Del. Mr. Everett comes to the Houdry Corp. from the Marshall-Morman Development Co. of New York, where he was engaged as a process engineer.

Dale F. Fahrendorf has been promoted to work directly under Jack L. Gordon, southwestern district manager of LURIA BROS. & CO., Philadelphia. He will be transferred from Chicago to St. Louis.

SANDVIK SPECIALIZED SPRING STEELS . . .

Do your requirements often call for consistent, repeated precision in spring steel?

In SANDVIK spring steels, accurate gauge is uniformly maintained both along and across the strip. This gauge uniformity assures continuous production precision from coil to coil.

SANDVIK high carbon and alloyed strip steels are supplied:

- **In special analyses for specific applications**
- **Annealed, unannealed or hardened and tempered**
- **Precision-rolled in thicknesses from .001"**
- **With bright finish or polished bright, yellow or blue**
- **With round edges or square edges**
- **In a wide range of widths**

Phone or write for further information.

SANDVIK STEEL, INC.
111 EIGHTH AVE., NEW YORK 11, N. Y.
WAtkins 9-7180

180 N. Michigan Ave., Chicago 1, Ill., FRanklin 2-1745
1736 Columbus Rd., Cleveland 13, Ohio, CHerry 2303
WAREHOUSES: New York and Cleveland
Sandvik Canadian Ltd., 426 McGill St., Montreal, Canada

give you
Continuous Precision

55-39

Quality Steels

SOME SANDVIK SPECIALTY SPRING STEELS — Band Saw Steels; Metal Band, Wood Band and Butcher Band · Camera Shutter Steel · Clock and Watch Spring Steels · Watch Parts Steels · Compressor Valve Steel · Doctor Blade Steel · Feeler Gauge Steel · Flapper Valve Steel · Knife Steels · Razor Blade Steel · Reed Steel · Shock Absorber Steel · Sinker Steel · Spring Steels · Tape and Rule Steel · Textile Steels · Trowel Steel · Vibrator Reed Steel

MICROSCOPIC CONTROL

helps to make and to keep MILFORD

ALL-HARD REZISTOR POWER BLADES

better than ever!

Yes, the research microscope is an everyday production tool with MILFORD . . . used constantly as a part of our exclusive heat-treating process to guarantee the consistent uniform hardness of every tooth.

Together with modern M-2 high speed steel . . . the MILFORD "know-how" in milling and setting . . . and the most exacting and rigid inspection possible . . . this positive laboratory controlled method of heat treatment is producing the finest power blades we've ever made.

And they're establishing new cutting records everywhere. Fully up to our own extensive tests which show 30% greater endurance . . . 28% more straight cuts . . . 5% faster.

You owe it to yourself to try this greatly improved blade on your own machines!

Order from your Industrial Distributor. He is always ready to serve your needs for all industrial supplies, including MILFORD hack saw and band saw blades.

MILFORD PROFILE AND BAND SAW BLADES REZISTOR AND DUPLEX HACK SAW BLADES

THE HENRY G. THOMPSON & SON CO.

Saw Specialists Exclusively for over 70 Years

NEW HAVEN 5, CONNECTICUT, U. S. A.

IRON AGE INTRODUCES

Continued

Waldemar Naujoks has been named special projects engineer of LADISH CO., Cudahy, Wis. Mr. Naujoks is past chairman of the Cleveland chapter of the American Society for Testing Metals.

T. W. GABRIEL, general sales manager, Firth Sterling Steel & Carbide Corp.

T. W. Gabriel has been named general sales manager of FIRTH STERLING STEEL & CARBIDE CORP., McKeesport, Pa. Mr. Gabriel has been sales manager of the Ohio district since August, 1944, when he left Carnegie-Illinois to join Firth Sterling.

OBITUARY

Wilbur R. Greenwood, Sr., 64, vice-president for sales and services of Pitney-Bowes, Inc., Stamford, Conn., died Nov. 3.

Harris S. Currier, 57, assistant district sales manager for the Detroit office of the Inland Steel Co., Chicago, died Nov. 2.

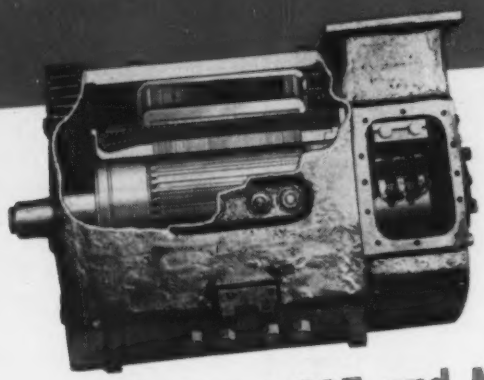
Henry P. Everitt, 55, assistant supervisor of employment in the Youngstown district of the Youngstown Sheet & Tube Co., Youngstown, died Nov. 4.

Harry B. Stewart, 56, executive vice-president and general sales manager of the Metal Tube U Housing Co., Dover, N. J., died Oct. 30.

Resume Your Reading on Page 26

UNIVERSITY OF MICHIGAN LIBRARIES

Here's how DOW CORNING SILICONE ELECTRICAL INSULATION PAYS OFF!



Motor rebuilt by
National Electric Coil Company
Columbus 16, Ohio

SUPERIOR HEAT and MOISTURE RESISTANCE PROVED AGAIN in diesel electric locomotives

The normal life of ordinary coils in locomotive freight service is about 500,000 miles. After 509,454 miles of freight service, this motor rebuilt by National Electric Coil Company with Dow Corning Silicone bonded and impregnated AIEE Class H Insulation, was inspected by Santa Fe maintenance men. Their report reads as follows: "The field coils look to be in perfect condition. No sign of working on the pole pieces. The field circuit meggers infinity and clears our hi-pot at 3,000 volts. The armature shows a slight chafing of 3 or 4 coils at the pinion end of the slot. Wedges appear to be in perfect condition and tight. *We are returning the unit to a passenger locomotive for further road service.*"

Multiply the life of your electrical equipment. Motor tests and practical experience in equipment ranging from large traction motors and net-work transformers to small rayon spinner bucket motors and solenoids, have proved that Class H Insulation made with Dow Corning Silicones has at least 10 times the life and 10 times the wet insulation resistance of Class B materials.

Photos Courtesy Santa Fe Railway

IF YOU HAVE an insulation problem involving high temperatures, heavy overloads or excessive moisture, contact our nearest branch office or write for bulletin No. T-11.

DOW CORNING CORPORATION
MIDLAND, MICHIGAN

Dow Corning

FIRST IN SILICONES

ATLANTA · CHICAGO · CLEVELAND · DALLAS · LOS ANGELES · NEW YORK CITY · CANADA · ENGLAND

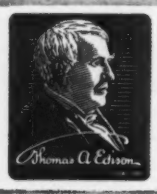
BECAUSE THEY ARE QUIET and fume-free, battery industrial trucks can be used in virtually any part of the plant. They can even be provided with spark-enclosed construction if fire and explosion hazards exist.

They use low-cost electric power and use it with peak efficiency . . . starting instantly, consuming no power during stops. Their electric motors have few wearing parts; are easy to maintain; rarely need repairs. Thus they have inherent economy and dependability.

They are doubly dependable and economical when powered by EDISON Nickel-Iron-Alkaline Storage Batteries. These are the longest-lived and most durable of all batteries, with steel cell construction, electrolyte which is a preservative of steel, and a foolproof principle of operation.

If you do not already use EDISON, get a current price quotation —you will probably find initial cost *much lower* than you think. Couple this factor with well-known EDISON long life and you will have the key to year-after-year economy.

ADVANTAGES OF EDISON NICKEL-IRON-ALKALINE BATTERIES: They're mechanically durable; electrically foolproof; quickly and easily charged; simple to maintain; not injured by standing idle.



EDISON
Nickel • Iron • Alkaline
STORAGE BATTERIES

EDISON STORAGE BATTERY DIVISION
of Thomas A. Edison, Incorporated, West Orange, N. J.
In Canada: International Equipment Co., Ltd., Montreal and Toronto

Auto Industry Will Lose More Than 2 Weeks' Production

Detroit — Automobile plants have already been so hurt by the steel strike that no matter how soon they start getting steel they will lose production. They may not lose as much as the pessimists have suggested but the loss will average better than 2 weeks' output. Some plants will cover this by closing down flat some time this month. Others will slow down until supply of the short items catches up.

The pinch is in sheets—particularly wide sheets. For while a plant may have an aggregate inventory of 30 days of steel there can be shortages on one or two items that will stop the whole works.

Automobile company buyers are not taking this lying down. They are already combing the mills for space to roll conversion steel.

An unexpected angle is the tightness in bars. They went into the strike in long supply, may wind up tighter than a drum. Steel mill district offices here are talking now about 6 to 8-week delivery — a distinct surprise to many local steel buyers.

Douglas Reveals a New Plane

Santa Monica, Calif. — Douglas Aircraft Co., Inc., has announced a larger, faster and more powerful DC-6 passenger liner to be known as the DC-6B. The new ship will carry 64 passengers instead of the 56 on the standard DC-6 and will have 1600 additional horsepower for takeoff. The builders report the new ship will have an average speed of 316 mph for over-ocean ranges up to 3560 miles with 54 passengers instead of the present 48.

Abrasive Plant Nears Completion

Vancouver, Wash.—Operations at the new $2 million plant of the Carborundum Co. of America are expected to begin within the next month or two.

Production of silicon carbide will be begun initially and it is reported that in the future other abrasive products will be turned out here.

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YOU CAN BE **SURE**.. IF IT'S

Westinghouse

Another Life-Line First!

The Broadest Exchange Plan!

Since February, 1949, Life-Line motors have offered you the broadest exchange plan in industry. All 1 to 20-hp, single-phase and three-phase a-c motors in frame 203 to 326 are included. No other manufacturer of motors—large or small—provides exchange service that compares in scope to this new Life-Line Motor Exchange Service.

120 Westinghouse exchange points assure you rush motor replacement service anywhere in the United States. Replacement motors, covered by this plan, are in stock, ready to be speeded to you at any time.

And what's more, if a motor fails during warranty period, it may be exchanged *free* for a motor of identical rating. The *exchange price,* beyond warranty, *is not dependent on the time in service . . . one year, five years or ten years.*

This service is one more advantage you get with Life-Line motors. Add this to all-steel construction . . . pre-lubricated bearings . . . an indicated savings of $750 per year per 100 motors . . . and you'll see why Life-Line has gained leading acceptance in the motor industry.

Complete details on the Life-Line Exchange Service—lists of exchange points and motor ratings covered—are given in the new booklet SM-5243. Get your copy today from your nearby Westinghouse representative or write direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-21533

Westinghouse *Life-Line* Motors

with a

BUCKEYE

STREAM POWER

VERTICAL GRINDER

Grinding automotive fifth wheels is a job that calls for plenty of power and continuous service under peak loads . . . and this Buckeye Vertical Grinder meets both requirements!

Operators like the way this compact, perfectly-balanced tool handles—its favorable power-weight ratio enables them to finish more work in less time, with far less effort.

And you'll like the way the Buckeye Vertical Grinder helps increase productive output—the way it stays on the job, grinding down production costs.

AIR TOOLS: Horizontal Grinders Vertical Grinders and Sanders • Shears • Nibblers • Air Wrenches • Drills & Screwdrivers

ELECTRIC TOOLS: Grinders, Buffers, Sanders, Polishers

GOT A TOUGH GRINDING JOB?

Then send today for your copy of the informative, fact-filled Buckeye air Tools Catalog.

The world's first rotary air tools were designed and built by

"packaged power"

Buckeye Tools CORPORATION

DIVISION 11 • DAYTON 1, OHIO

• *News of Industry* •

Allis-Chalmers Earnings Up

Milwaukee—Allis-Chalmers Mfg. Co. reported net earnings of $3,616,230 for the third quarter of 1949, compared with $3,562,854 for the same quarter of 1948. Net earnings for the first three quarters of this year totaled $13,493,658, compared with $9,869,512 for the same period in 1948.

Unfilled orders as of Sept. 30, 1949, amounted to $110,576,632, compared with $123,751,394 on June 30, 1949, and $165,506,027 on Sept. 30, 1948.

For the 9 months of 1949, billings amounted to $270,454,453, and bookings, $232,752,620. For the comparable period in 1948 billings were $225,512,784 and bookings, $221,465,590.

Westinghouse Net Sets Record

Pittsburgh—Westinghouse Electric Corp. reported the largest 9 month net income for any year of the company's history. For the first three quarters of this year, net income amounted to $48,964,408, compared with $37,296,345 for the corresponding period of 1948. Net income for the third quarter of this year totaled $20,554,447, compared with $9,855,245 in the same quarter of 1948.

New orders received in the first 9 months of this year totaled $728,630,361, compared with $822,729,940 in the same months of 1948. Backlog of unfilled orders on the company's books at the end of September this year amounted to $603,940,943, compared with $723,680,403 on the same date in 1948.

Bendix Sales Up 45 Pct

South Bend, Ind.—Bendix Home Appliances, Inc. reported a 45 pct increase in the third quarter, above second quarter, in sales volume. A net of $435,896 or 41¢ a share in the first 9 months of 1949 compared with $3,756,593 and $3.55 a share in the like period last year. Sales for third quarter this year were also lower than last when earnings dipped to $407,324 or 38¢ a share against $1,197,291 or $1.13 a share for the third quarter of 1948.

FREE

PUBLICATIONS

Continued from Page 36

tions and mechanical and physical data are included. *R. C. Wellman Associates. For more information, check No.* 11 *on the postcard on p.* 37.

Pipe

The chemical products handled by MPC piping and typical industries served are classified in a new 4 p. brochure. MPC piping includes stainless steel and monel metal subing. *Michigan Pipe Co. For more information, check No.* 12 *on the postcard on p.* 37.

Malleable Castings

Advantages of malleable iron castings and illustrations of the expanded facilities of the manufacture are included in a new 8 p. pamphlet. Various stages of operating in casting production are illustrated and services described. *Maumee Malleable Castings Co. For more information, check No.* 13 *on the postcard on p.* 37.

Drill Bushings

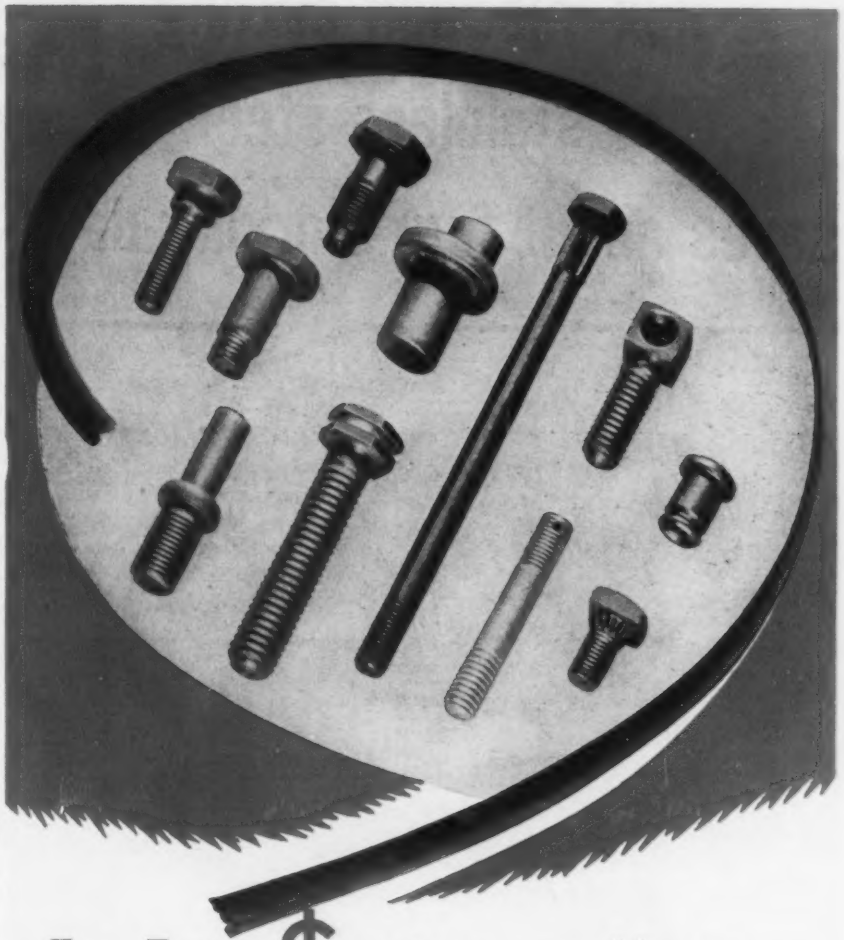
A new 16 p. catalog, B-1018, describes drill jig bushings, locating pins, rest buttons, lock screws and clamps, with specifications, tolerances, etc., on standard bushings. With the catalog is a new price list. *Universal Engineering Sales Co. For more information, check No.* 14 *on the postcard on p.* 37.

Form-Ground Tools

Form-ground production tools are described in 4-p. pamphlet through the use of text and photos. *J & S Tool Co. For more information, check No.* 15 *on the postcard on p.* 37.

Electric Power

"Electric Heat," a new catalog, describes and illustrates the variety of industrial applications of electricity. Included are descriptions of arc melting, dielectric heating



For Extra $avings on Your
Special Threaded Parts
use the KAUFMAN PROCESS
and CLEVELAND *Top Quality* SERVICE

You may be surprised to find how well and how economically your special fasteners and parts can be produced by the Kaufman Process. A cold forging process, it enables us to single or double extrude your parts, giving them added strength for their important job. A faster process, it enables us to give you prompt delivery, once your schedules are set. It pays you to send your blue prints and specifications for estimate.

THE CLEVELAND CAP SCREW COMPANY
2917 East 79th Street • Cleveland 4, Ohio

CLEVELAND *Top Quality* FASTENERS

ORIGINATORS OF THE
KAUFMAN DOUBLE EXTRUSION PROCESS
Specialists for more than 30 years in
CAP SCREWS, SET SCREWS, MILLED STUDS
Ask your jobber for Cleveland Fasteners

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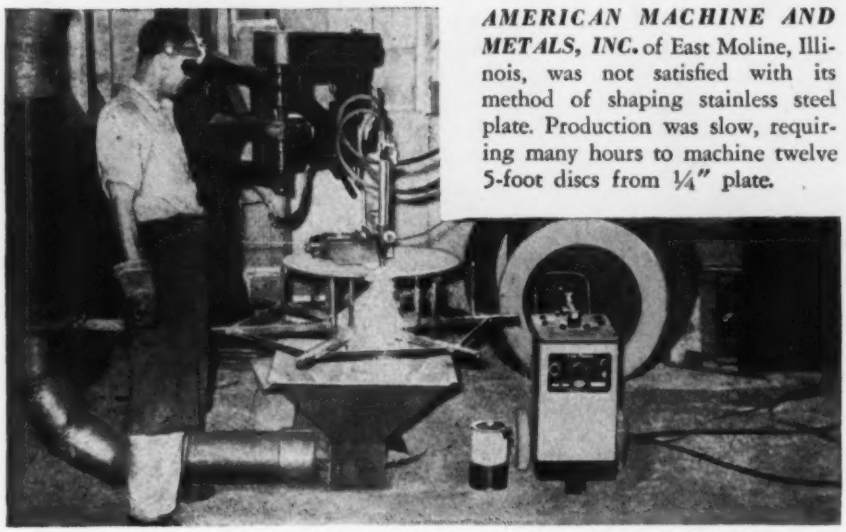
flux-injection cutting of stainless steel saves about four working days



AMERICAN MACHINE AND METALS, INC. of East Moline, Illinois, was not satisfied with its method of shaping stainless steel plate. Production was slow, requiring many hours to machine twelve 5-foot discs from ¼" plate.

W. J. Carle, Airco Technical Sales Representative, was asked to offer his recommendations. He suggested Airco's Flux-Injection method of oxyacetylene cutting stainless steel, using a No. 10 Radiagraph with a special set-up to facilitate cutting and fume exhaustion.

Production jumped immediately ... and American Machine is pleased with the savings in time . . . trouble . . . and money. Now, manufacturing time for the twelve 5-foot discs takes only 8 hours — a reduction of 79% in production time.

. . . .

TECHNICAL SALES SERVICE — ANOTHER AIRCO PLUS-VALUE FOR CUSTOMERS
To assure its customers of high efficiency in all applications of the oxyacetylene flame or electric arc, Air Reduction has available the broad, practical experience of its nationwide Technical Sales Division personnel. The collective experience and knowledge of these specialists has helped thousands to a more effective use of Airco processes and products. Profit by this Airco "Plus-Value" service. Ask to have a Technical Sales Division man call today. Write: Your nearest Airco office. In Texas: Magnolia Airco Gas Products Company. On West Coast: Air Reduction Pacific Company.

AIRCO **AIR REDUCTION**
Offices in Principal Cities

Headquarters for Oxygen, Acetylene and Other Gases... Calcium Carbide... Gas Cutting Machines... Gas Welding Apparatus and Supplies ... Arc Welders, Electrodes and Accessories

FREE PUBLICATIONS

Continued

brazing, immersion heating, infra red heating and other applications. *Cleveland Electric Illuminating Co. For more information, check No.* 16 *on the postcard on p.* 37.

Clutches

Applications, capacities, and advantages of Airflex clutches are described in a new 8 p. bulletin. Included is a list of industrial equipment using this type of clutch, along with details of how it is used. *Fawick Airflex Co., Inc. For more information, check No.* 17 *on the postcard on p.* 37.

Steel Shapes

A variety of commercial steel shapes are shown in this 20 p. catalog. The catalog includes engineering data, illustrations of the components, and short descriptions of each shape. *Commercial Shearing & Stamping Co. For more information, check No.* 18 *on the postcard on p.* 37.

Toolholder

A full floating toolholder for the correction of misalignment is described in a new 4 p. illustrated bulletin. The toolholder is designed to correct both parallel and angular misalignment. A price card is included. *Erickson Tools Div., Erickson Steel Co. For more information, check No.* 19 *on the postcard on p.* 37.

Cutoff Machine

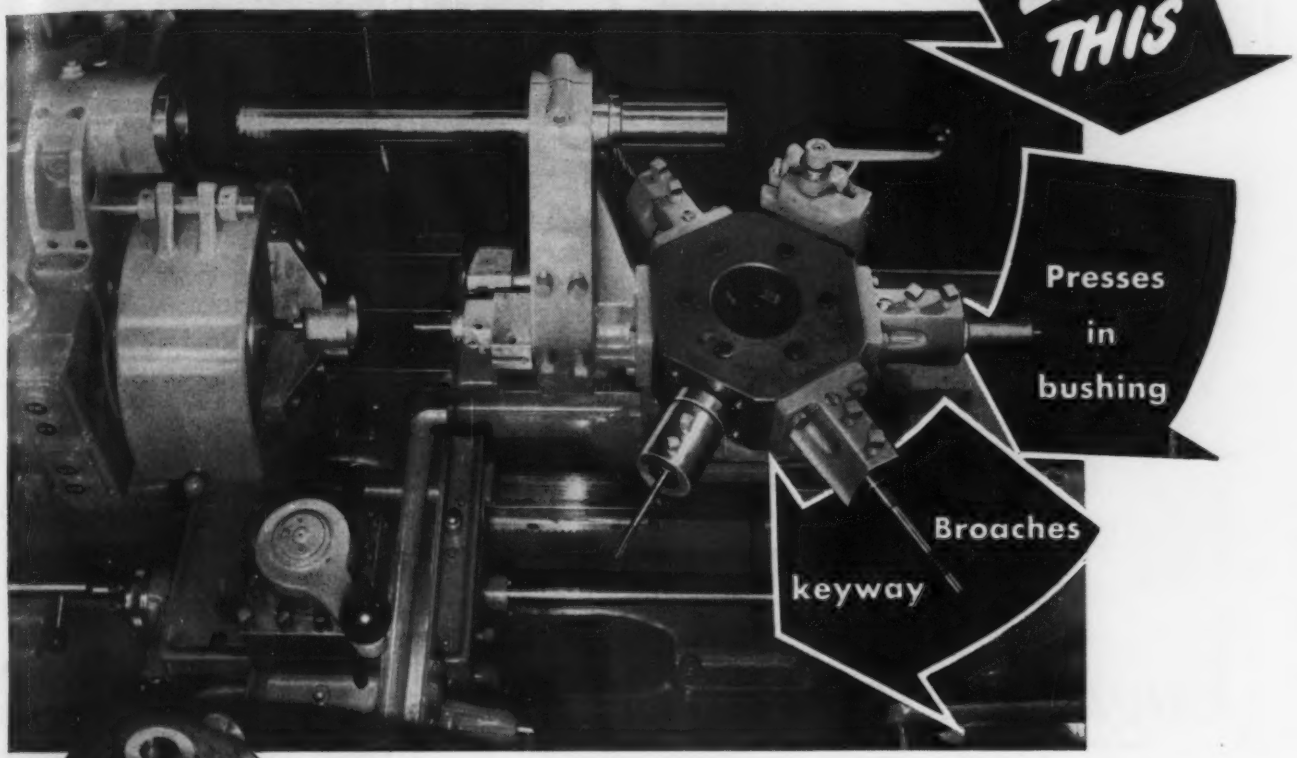
A geared-in-head motor, self-centering vise, minimum arc of contact, operator safety and flexibility are features of a new swing-cut cutoff machine described in a 2 p. brochure. Cutting data is also included. *Stone Machinery Co. For more information, check No.* 20 *on the postcard on p.* 37.

Radiant Heating

Text, photos, and charts in new 20-p. radiant heating handbook show design, installation and tests of actual installations. *Copper & Brass Research Assn. For more information, check No.* 21 *on the postcard on p.* 37.

Resume Your Reading on Page 37

Turret Lathe Ideas— LIKE THIS



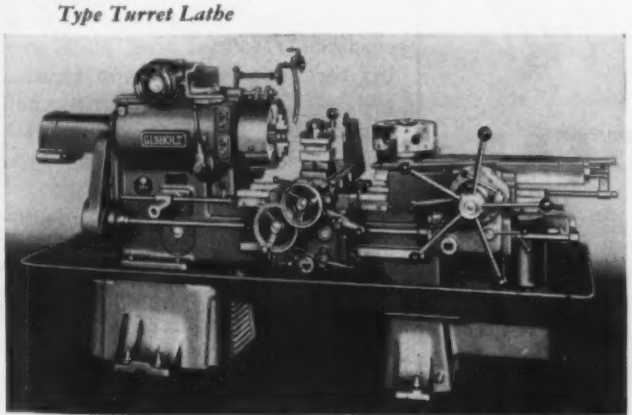
Save you time and money... INCREASE PRODUCTION!

Darned clever, these production men!

Note the use of this Gisholt No. 3 Ram Type Turret Lathe. In addition to handling all the typical drilling, boring, facing and reaming operations on the inside of a small motor housing, this turret lathe is used to:

Broach the keyway
Press in a bushing
Finish machine in place

Gisholt No. 3 Universal Ram Type Turret Lathe



The entire operation on these parts takes only 1.37 minutes. Figure the time and cost saved in not having to transfer parts to other machines—or other departments—for these operations.

Don't overlook the many ways you can get greater production from your turret lathes. Gisholt engineers have all kinds of money-saving ideas to help you with your problems. Ask one to call. Or write us.

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY
Madison 10, Wis.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

FREE
TO GEAR BUYERS

everything that Purchasing Executives, Design and Production Engineers would want to know about a potential source of supply for their custom gear requirements is covered in this new bulletin on **PERKINS GEAR ENGINEERING SERVICE**

Write now for your copy!

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West Springfield, Massachusetts
Springfield 7-4751

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NEW

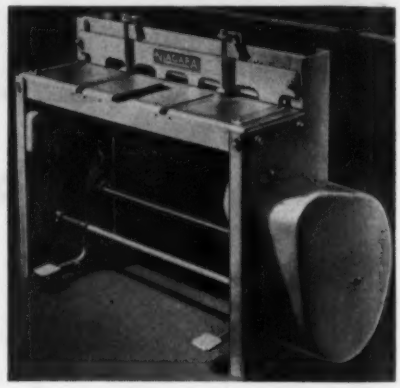
PRODUCTION IDEAS

Continued from Page 40

off the feeder. A roller table track supports the stock and minimizes friction. *Wells Mfg. Corp. For more information, check No. 32 on the postcard on p. 37.*

Light Power Shears

High speed power shears for light gage sheet metal can operate continuously at 125 strokes per min on mild steel up to 20 gage, producing cuts that are straight and clean. Full visibility of the cutting edge through the arched openings and over the top of the hold-down bar

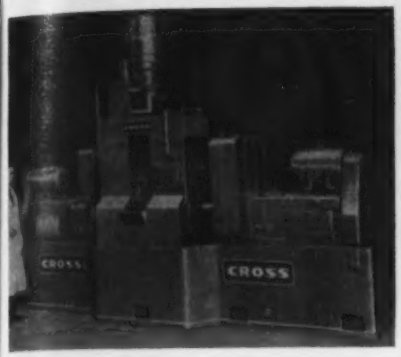


facilitates shearing to accurate layout lines. Housing, bed, holddown and crosshead are fabricated from electrically welded steel plate, giving strength, rigidity and reduced weight. Fitted bronze bearings and ways assure long life and dependable service. An axial air gap type motor is in the right hand upright making a compact covered motor drive unit. *Niagara Machine & Tool Works. For more information, check No. 33 on the postcard on p. 37.*

Transfer Machine

A new machine created for machining axle shift forks that are part of two-speed truck axles, performs 12 different operations on 87 pieces per hr at 100 pct efficiency and with one unskilled operator. Four stations are provided: the

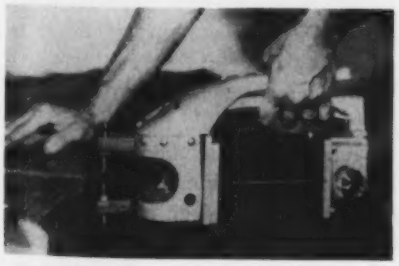
first used for loading and unloading; at the second, large and small holes are drilled in the boss of the shift fork; at station 3, the large hole is reamed, and two bosses are



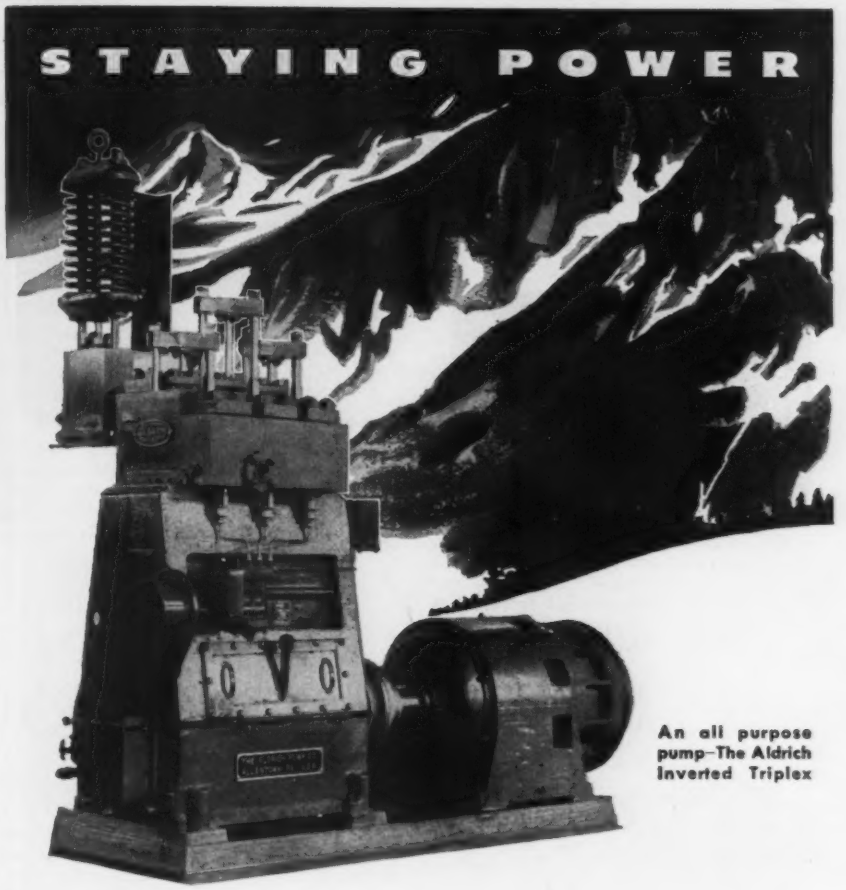
milled together with the slot in the shank; at station 4 two holes in the fork are drilled and reamed while the ends of the large hole are spot faced and chamfered. The machine is designed to handle eight different part sizes. Use of standard Cross sub-assemblies provide flexibility for part design changes and permit easy maintenance. Other features include fluid motor drive for power indexing, hydraulic feeds, hardened and ground steel ways, and automatic push-button working cycle. *Cross Co. For more information, check No.* 34 *on the postcard on p.* 37.

Spot Welder

A portable spot welder, Big Shot, is a light weight 22-lb unit that is operated with one hand, leaving the other hand free to move and position the work. Its size, 4 x 4 x 15



in. and special rounded nose, top and sides make it possible to reach difficult places. Big Shot is equipped with a Modulator, or power control that can be adjusted to varying power conditions. The upper tong which rests over the place to be welded, is fixed; the lower tong moves. Tips are adjustable to suit



An all purpose pump—The Aldrich Inverted Triplex

Mountains . . . there's rugged grandeur in a range of mountains—and staying power!

There's a similar power in the Aldrich range of high pressure pumps. Every industrial or engineering specialist knows that machinery must have *staying power*—the ability to maintain top performance and high efficiency over long periods of time. They know that interruptions are costly, while *staying power* pays. Aldrich Pumps have that *staying power!*

Take a look at the Aldrich design and construction that make rugged service easy. Note the plungers above the crankshaft, which provide for simplified drive—through speed-reducers or by direct coupling to a driver located on the floor. Expensive foundations are eliminated.

Wherever high pressure pumping is required—and Aldrich Pumps are used—the result is lasting service. Write now for complete technical information. Request Data Sheet 66.

Representatives: Birmingham • Bolivar, N. Y. • Boston • Chicago • Cincinnati Cleveland • Denver • Detroit • Duluth • Houston • Jacksonville • Los Angeles New York • Omaha • Philadelphia • Pittsburgh • Portland, Ore. • Richmond, Va. St. Louis • San Francisco • Seattle • Spokane, Wash. • Syracuse • Tulsa

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The **FIRST** *Name in Reciprocating Pumps*

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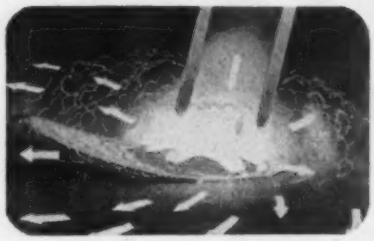
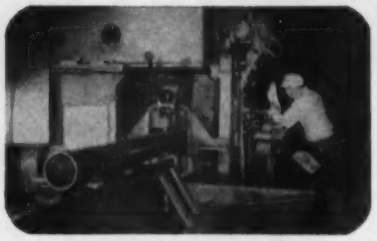
See this film and find out!



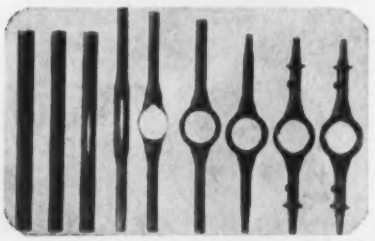
1. **"ARC WELDING AT WORK"**, a 16mm. full-color motion picture produced by General Electric, has a message for every cost-conscious executive who may be overlooking opportunities for arc welding in his own plant. A vivid animated treatment (above)...

2...makes the technical parts of this film highly palatable. New uses for arc welding are suggested throughout. Welded building construction, for example (above) is shown to be efficient and economical. And as outdoor pressure vessels and piping...

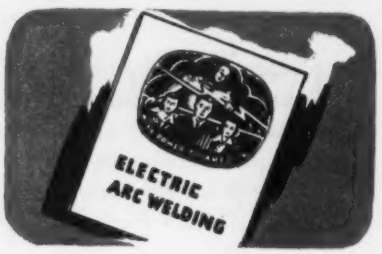
3...become larger and more complicated the value of modern arc welding becomes more and more evident. In fabricating a consumer product like kitchen sinks (above), the film shows how high-quality welding adds extra eye appeal and salability.



4. As exemplified in this tubing machine (above) automatic arc welding is shown to offer almost limitless opportunities. Here, precise heat control is the big factor. Also, arc welding provides highly ductile joints, a fabricating requirement for...



5...this automotive rear-axle housing (above). These welded joints withstand ten severe stretching and swaging operations, with no sign of failure! Because we believe you can profit from a wider knowledge of arc welding, let us send you this...



6. **ARC WELDING MANUAL . . . FREE!** It has all the data you need to make an intelligent decision on this vital subject. [The complete program consists of a 30-minute film, manual and "highlights" booklets.] MAIL THE COUPON TODAY!

FREE
to business management!

General Electric Co., Section F684-13
Schenectady 5, N. Y.

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☐ Please send me a complimentary copy of the G-E Arc Welding Manual (GES-3491). (Extra copies at regular manual price—$1.25.)

☐ I'd like to borrow a 16mm print of the color film from my nearest G-E office.

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GENERAL ELECTRIC

each operation, and can be filed as they wear. The 110 v unit welds two sheets of weldable steel 20 to 18 gage, galvanized iron, Monel and Hoskins alloys, stainless steel two gages thicker; 220 v unit welds up to ⅛ in. thickness. The unit is safe from shock, insulated to pass a test at 1600 v. *Tool & Equipment Distributors. For more information, check No.* 35 *on the postcard on p.* 37.

Whiteprinting Machine

Printing and developing ammonia vapor white prints continuously, in cut sheets or from rolls, at speeds ranging up to 32 fpm is possible on a new automatic machine that reproduces tracings, drawings, foil, film or anything typed, written or drawn on reasonably translucent paper. This new

Pacemaker accommodates all types and sizes of diazo materials up to 42 in. wide. Its few controls are within easy reach of the operator. Automatic signal lights indicate various conditions in the functioning of the machine during its operation. A push button master switch controls all electric motors and heaters, instantaneously starting or stopping the entire mechanism. A new type interlocking roller developer develops all types of diazo materials without sticking, scratching or wrinkling. The Pacemaker operates on 200 to 250 v, 60 cycles single phase ac. *C. F. Pease Co. For more information, check No.* 36 *on the postcard on p.* 37.

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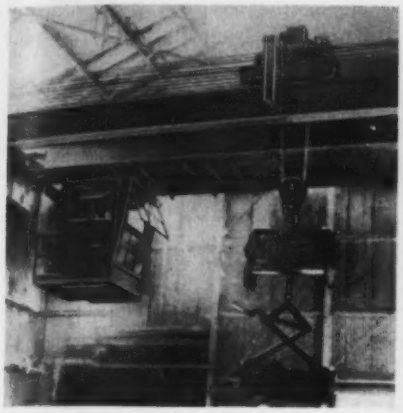
Air-Conditioned Crane

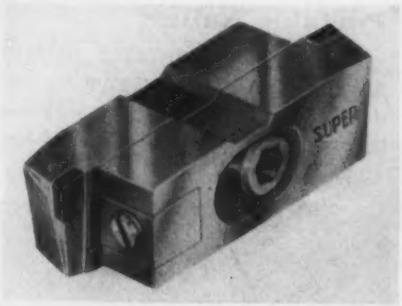
Designed for efficient operation over furnaces where high temperatures and noxious fumes are present, this 10-ton crane is equipped with an air-conditioning unit that removes dust and cools air. It neu-



tralizes the effect of noxious fumes by means of activated carbon filters. Slip ring motors have glass insulation and thermo guards. A protective baffle plate is provided under the trolley and thermo pane windows. *Euclid Crane & Hoist Co. For more information, check No.* 37 *on the postcard on p.* 37.

Roughing Blade

A new carbide tipped expansion type roughing blade for boring bars is ruggedly built for heavy cuts with extra support for the carbide tips. It is expanded by loosening



the set screw and a lock screw in the slide holds it in fixed position. Size of the new rougher ranges up to 4 in. *Super Tool Co. For more information, check No.* 38 *on the postcard on p.* 37.

Continuous Acting Pump

A continuous acting air-operated pump features the new air motor that runs continuously by holding open the valve that controls the air

Can your Spring Coiler make this?
THERMOSTATIC COIL
"The tougher they are . . . the faster they fall"
Some springmakers we know are apt to go slightly "overboard" in their enthusiasm for Torrington Spring Coilers. We'll admit these machines just can't be beat for *speed, accuracy* and *economy;* that their *versatility* is practically human — but we'll leave any exaggerated claims to our enthusiastic and satisfied customers. And of course we're pleased there are so many of them!
The thermostatic coil, shown above, is typical of the exacting work you can produce with a Torrington Spring Coiler. For details, or information on any special problem you may have, just write our Sales Department.
Torrington's W-11 Spring Coiler
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Kester Flux-Core Solders are made with a single core in several core sizes ranging from an opening that contains ½ of 1% to 7% of flux by weight. These core sizes are available in each of 68 strand sizes. Use of the correct size assures you of absolute soldering control. Consult our Technical Department on any soldering problem.

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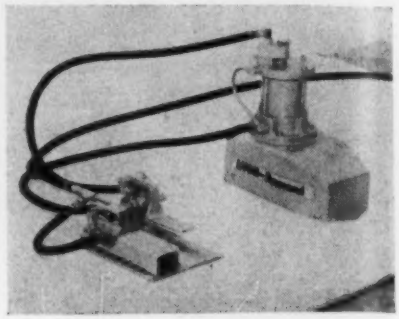
supply. A reciprocating valve alternately diverts air pressure from one side of the air piston to the other and a large air piston is directly connected to a small hydraulic piston which pumps oil under



high pressure. A built-in release valve permits pressurized oil in the hydraulic cylinder to return to the reservoir by gravity. A single, three-position, four-way valve operates the release and controls the pumping action. Working oil pressure of 1000 psi can be obtained from a 90 psi air pressure. The displacement of oil per stroke-cycle is 3.4 cu in. One to 1½ gpm can be pumped depending on the air pressure. Air consumption is 3.5 cfm at an average pumping rate. *Lyon-Raymond Corp. For more information, check No.* 39 *on the postcard on p.* 37.

Portable Nailer

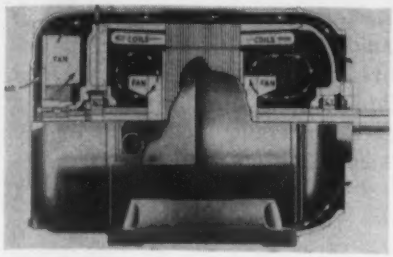
A new hand-operated portable nailer with an automatic feed drives the longest Heller lock-nail through light metal, prestwood and

into hard wood with one blow. The machine is shockproof, lightweight, and well balanced for easy driving.

Lock-nails are galvanized, copper, bronze, or electroplated, in sizes 7/16 to 1⅛ in. *Heller Co. For more information, check No. 40 on the postcard on p. 37.*

Fan-Cooled Motors

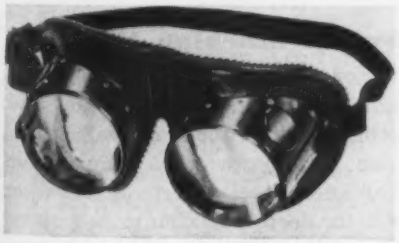
Air cooled ball bearing motors identified as Type TEFC feature constant speed, continuous duty, squirrel cage induction with high torque and low starting current.



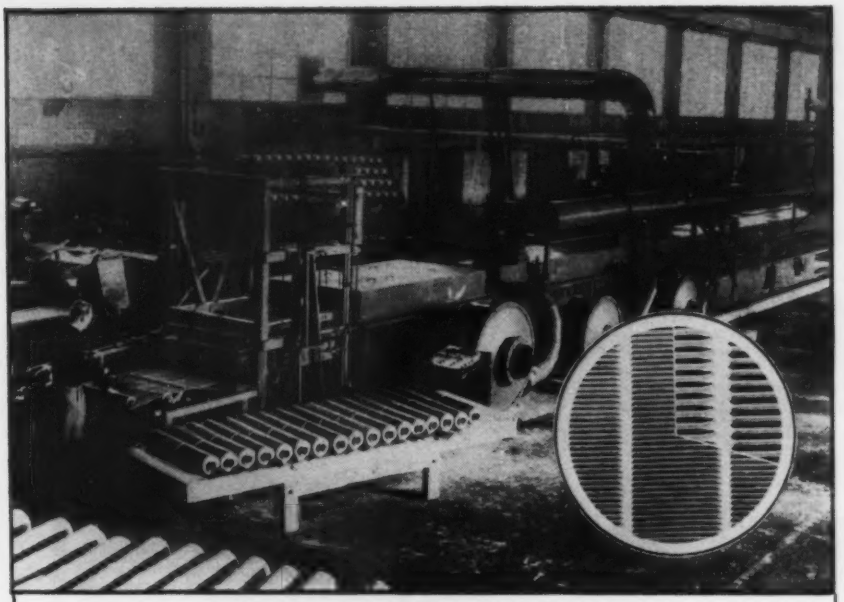
They are polyphase, 50 or 60 cycle in sizes ranging from 2 to 60 hp. The motor housing is totally enclosed. Air is drawn in through the external hood, passed over the stator core and out over the pulley bearing. Small fan blades on the rotor circulate the air inside, transferring the heat to the frame and end bells and cooling the motor completely. *Valley Electric Corp. For more information, check No. 41 on the postcard on p. 37.*

Goggle

Comfortable, lightweight protection is provided by a leather mask goggle for hot, dusty jobs. The goggle mask is made of pliable leather that absorbs and distributes impact shock. A one-piece elastic head-



band is adjustable, making the goggle practical for any face or head size. One style for hot jobs has deep, well-perforated eye cups to permit air circulation and reduce fogging. Edges are corduroy fabric-bound to absorb perspiration. Style DL48 is indirectly ventilated with two baffled and screened ports on each eye cup, and is used especially



The Alodizing installation a Permanente's Trentwood, Washington plant. Kaiser Aluminum Shade Screening (shown in inset) excludes insects and, venetian-blind-wise, deflects the rays of the sun thus reducing room temperatures as much as 15° F. without interfering with air circulation.

This screening is produced by the Permanente Metals Corporation and sold by Permanente Products Company to screen manufacturers, distributors and dealers throughout the nation.

Alodized* **ALUMINUM**
provides
Kaiser Aluminum SHADE SCREENING
WITH MAXIMUM PROTECTION

Kaiser's new departure in screening, shown above, utilizes "Alodine"—the new development in metal protection. "Alodine" greatly increases the natural weather resistance of aluminum and reduces reflectivity by masking aluminum's metallic luster with a pleasing shade of green.

Alodizing is a purely chemical process—not an electrolytic one—and involves no elaborate apparatus. The coating solution is applied rapidly, uniformly and at low cost. Spray, dip, and even brush processes make Alodizing available to all kinds of installations; and manufacturers of aluminum are Alodizing on a huge scale at their mills to supply Alodized sheets and coils to plants lacking facilities for treating the metal.

"Alodine" promotes economy in production; and protects the quality of finished aluminum products. Insist on Alodizing and Alodized aluminum in your own fabrication. Write to us for further information on "Alodine".

* "Alodine" Trade Mark Reg. U. S. Pat Off. by The American Chemical Paint Company.

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Ready-Power-Equipped Crescent Platform Truck

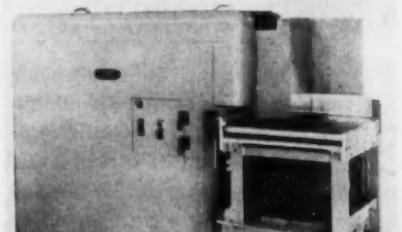
THE READY-POWER CO.

3822 Grand River Ave., Detroit 8, Michigan

for dusty jobs. Impact-resistant super tough lenses are used in both models. *Willson Products, Inc. For more information, check No. 42 on the postcard on p. 37.*

Package Feeder

A package feeding mechanism for standard wire tying machines positions crates, boxes, cartons or bundles automatically for the desired number of ties by the machine. The unit regulates both conveyer traffic and tying operations. The operator regulates the



mechanism to the desired number of wire ties, by a control switch. A roller drive and an air-operated pusher, electrically controlled, get box or carton into the proper position in the tying machine. The roller drive shuts down when the pusher is in operation, preventing jam-up of packages. *Curtis Development & Mfg. Co. For more information, check No. 43 on the postcard on p. 37.*

Swivel Machine Vise

For holding work on shapers, milling machines, drill presses and other machine tools, a small swivel vise has jaws with replaceable hardened steel inserts 4 in. wide x 1 in. deep. Maximum jaw opening is 4 in. The base has two open slots spaced 7½ in. apart for bolting the vise to the machine table. The vise swivels 180°, reading from 0 to 90°, right or left. Positive swivel locking is provided by two socket head screws and plug binders. *South Bend Lathe Works. For more information, check No. 44 on the postcard on p. 37.*

Resume Your Reading on Page 41

Armco Begins Construction Of Its New Openhearth Plant

Middletown, Ohio—Ground was broken last month for the construction of the new $12 million openhearth plant at Armco Steel Corp.'s East Works by W. W. Sebald, president of Armco.

The new plant will consist of three 225-ton openhearth furnaces. They will be capable of producing 400,000 tons of steel ingots annually.

It is expected that the new unit will create about 500 jobs and it will be completed in about 15 months.

Tells of Natural Gas Shortage

Grand Rapids, Mich.—M. Joseph Clancy, executive secretary of the Wisconsin Coal Bureau, before the midseason conference of the Michigan Coal Merchants Assn. held here, said that the pipelines are being troubled by shortage of natural gas. He declared, "In the question of future reserves, many of the transcontinental pipelines are having a difficult time establishing new reserves to satisfy the new proposed area they are attempting to serve." He said further that all the old and new pipelines are moving over to the gulf region which is some 600 miles from the Panhandle and Huguton Field, and they are paying premium prices and spending large sums of money in building gathering lines.

Navy Contract for Central Iron

Washington—A contract to supply the Navy Dept. with 1529 steel hull and boiler plates totaling more than 1400 tons has been awarded the Central Iron & Steel Co., of Harrisburg, Pa. The contract price was $132,798.54.

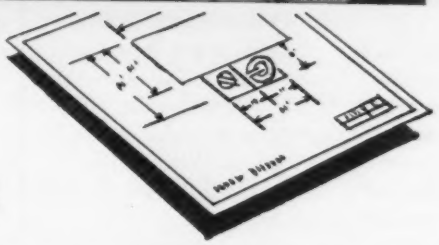
One Navy contract for $56,000 went to Chrysler Corp. and another for $188,000 to the Collins Radio Corp. at Cedar Rapids, Iowa.

A contract to supply 720,000 troy oz of bar silver (999 fine) was awarded to American Smelting & Refining Co. for a bid of $147,700.

TOP PERFORMANCE WITH AJAX TAMA-WYATT

INDUCTION FURNACES for Aluminum Alloys

Ajax Induction Holding Furnace at Mid-Western Die Casting Co., Chicago, Illinois.



BETTER PRODUCTION THROUGH TOP PERFORMANCE IS THE AJAX RECORD

Ajax-Tama-Wyatt induction furnaces are used in the United States and abroad for melting and holding aluminum alloys in die casting, permanent mold, and sand foundries.

No flux or mechanical stirring is necessary. The metal is in constant gentle circulation assuring complete blending of alloys, and a uniform temperature throughout the metal.

Electric energy costs less than fuel and avoids danger of overheating. Completely automatic temperature controls hold metal to within 5° F., at the lowest possible temperature for perfect casting. With an Ajax the yield for perfect castings is exceptionally high.

There are no fumes and operation is practically noiseless. Shops are cooler, more comfortable—manpower efficiency is increased. Shop space is increased, for an Ajax Holding Furnace takes an average of 30 to 40 per cent less floor space than any other furnace.

The Ajax companies have been pioneers in induction melting of metals since the first World War. To date they have installed more than 400,000 KW. of furnace capacity in the United States alone. This is the background of experience behind every Ajax installation.

AJAX ENGINEERING CORPORATION • TRENTON 7, NEW JERSEY

AJAX TAMA-WYATT INDUCTION MELTING FURNACE

Associate Companies: AJAX METAL COMPANY, Non Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

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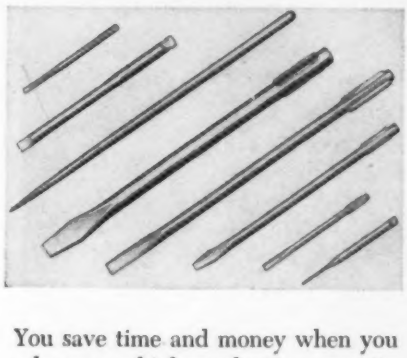

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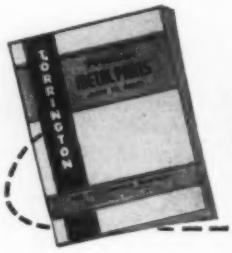

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Iron Steel Imports Rise While Exports Remain Unchanged

Washington — Imports of iron and steel rose slightly in August to 7448 net tons, while exports remained fairly steady at 483,689 net tons during the month, according to the Commerce Dept. and American Iron & Steel Institute.

Total iron and steel exports for the first 8 months of 1949 are reported at 3,794,552 net tons, while total imports for the same period are given as 356,603 net tons. Slightly more than 1 million tons of scrap arrived at U. S. ports during the first 8 months, while 415,853 tons was shipped out in the same period.

Product-by-product tabulations for exports and imports issued jointly by the two offices follow:

	August, 1949	First 8 Months, 1949
EXPORTS:		
Semifinished and Finished Products:		
Ingots, blooms, billets, slabs, sheet bars	38,820	209,830
Wire rods	7,084	43,238
Skelp	13,835	77,922
Concrete reinforcement bars	9,243	88,853
Steel bars, cold-finished	2,825	31,738
Other steel bars (excluding alloy)	26,373	220,264
Alloy steel bars	1,445	17,008
Welding rods, electric	1,285	12,420
Plates including boiler, not fab.	52,949	322,940
Plates, fab., punched or shaped	5,022	23,802
Iron sheets, black	1,931	15,433
Steel sheets, black	68,207	387,624
Galvanized sheets	9,412	60,423
Strip steel, cold-rolled	4,671	44,229
Strip steel, hot-rolled	6,753	62,220
Tinplate	36,040	411,698
Terneplate	557	7,690
Structural shapes, plain	29,383	243,574
Structural shapes, fab.	8,618	102,683
Sheet piling	1,664	13,818
Rails, 60 lb per yd and over	10,449	142,728
Rails, less than 60 lb per yd	398	5,882
Rails, relaying	1,147	19,096
Splice bars and tie plates	1,410	15,961
Frogs and switches	321	4,976
Car and locomotive wheels, tires and axles	8,214	38,882
Seamless black pipe and tubes	2,184	20,342
Seamless casing and line pipe	24,978	197,887
Seamless boiler tubes	4,152	32,335
Welded black pipe	9,379	73,840
Welded galvanized pipe	10,276	58,332
Welded casing and line pipe	24,647	166,028
Welded boiler tubes	568	3,408
Other pipe and fittings	5,555	50,527

toughen metal improve surface end stock waste

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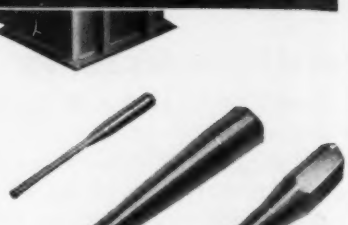

The Torrington Rotary Swaging Machine delivers 4000 hammer blows a minute...reduces, sizes, rounds, points and tapers rod, wire and tubing... work-hardens metal for toughness and resilience...produces a burnished surface... utilizes every bit of stock.

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Please send a copy of "The Torrington Swaging Machine" to:

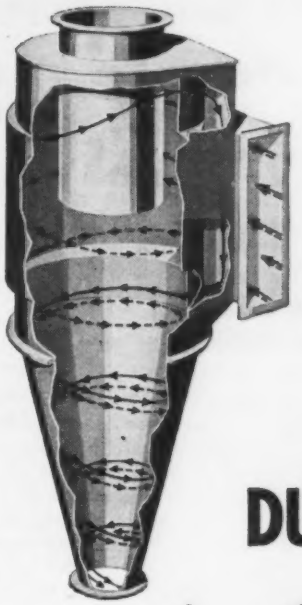
Name_____

Firm_____

Address_____ 5

	August, 1949	First 8 Months, 1949
EXPORTS:		
Semifinished and Finished Products:		
Plain wire	5,585	60,717
Galvanized wire	4,670	46,607
Barbed wire	11,792	54,215
Woven wire fencing	1,693	12,798
Woven wire screen cloth	300	3,258
Wire rope and strand	950	9,874
Wire nails	2,628	21,199
Other wire and manufactures	1,300	16,573
Other nails, incl. staples and horseshoe nails	933	7,640
Bolts, nuts, rivets and washers, except railroad	1,882	19,500
Forgings	1,644	19,660
TOTAL	463,770	3,508,433
Other Finished Products:		
Tanks, complete and knocked down	5,786	81,322
Metal lath	242	4,543
Tin and galvanized hollow ware	190	1,825
Tin cans, finished or unfinished	2,078	25,462
Mall iron screwed pipe fittings	249	4,070
Cast iron pressure pipe and fittings	3,453	29,733
Cast iron soil pipe and fittings	1,756	7,673
Iron castings and ingot molds	3,787	36,110
Steel castings	310	2,037
Sprocket and other power trans. chains	374	3,799
Other chains	500	4,350
TOTAL	18,745	201,519
Pig iron	491	69,845
Ferroalloys	683	14,755
TOTAL	1,174	84,600
GRAND TOTAL	483,689	3,794,552
Iron and steel scrap	29,104	415,853

	August, 1949	First 8 Months, 1949
IMPORTS:		
Semifinished and Finished Products:		
Steel ingots, blooms, etc.	5,045	31,108
Wire rods	232	2,969
Concrete reinforcement bars	...	4,417
Hollow bar and drill steel	1	35
Other steel bars	13	17,824
Boiler and other plate	103	24,058
Sheets, skelp, sawplates, n.e.s.	384	8,605
Other hoops and bands	...	5,309
Structural shapes and sheet piling	407	111,950
Rails and fastenings	8	996
Pipe and tubes	...	5,250
Flat wire and strip	153	1,247
Wire rope and strand	21	405
Nails, tacks and staples	59	1,246
Die blocks and blanks	...	648
TOTAL	6,437	216,986
Pig iron	6	77,735
Sponge iron	138	1,805
Ferromanganese (mang. content)	46	49,553
Ferrosilicon (silicon content)	103	652
Ferrochrome (chromium content)	120	2,253
Other alloys used in steel manufacturing	581	7,360
TOTAL	994	139,358
GRAND TOTAL	7,448	356,603
Iron and steel scrap	43,207	1,027,628



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TAGLINE

Available in 8 models to provide proper tension and sufficient cable pull out for various size buckets. Used as standard equipment by all leading crane manufacturers.

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Tagline CORPORATION

2131 East 25th St., Los Angeles 11, Calif.

—Dear Editor . . .

Swedish Iron Powder Imports Defended

Dear Sir:

In IRON AGE of Nov. 3, p. 111, it was stated that the domestic iron powder industry was threatened by imported Swedish powder iron, or at least that that is the feeling of the industry.

We believe the domestic industry has more facts in this matter than were presented. Will you take some from us, as an answer to the allegations?

It was stated that specified tonnages of domestic production are going into various uses. Among others, some 1500 tons annually to compacting of small parts, bearings and friction uses, and that we are primarily in competition with that phase of domestic powder production.

The figures given on tonnages and distribution we will accept for the sake of this discussion, and also that the Swedish iron is primarily going into parts making, of one type or another.

The electronics market is large, but not yet fully developed. It is served by a mixture of carbonyl iron (at about $1.00 per lb), iron by hydrogen (40 to 60¢ per lb), electrolytic iron (30¢ per lb), the softest, specially prepared reduced powders (12 to 18¢ per lb), magnetite (8¢ per lb). Even our comparatively crude product is used to some extent in this field. It is a large market, but it is somewhat limited in growth possibility.

Market Tonnages

Then some "100 tons a year are sold for miscellaneous applications." We believe the tonnage is larger, but at all events it is mostly specially prepared and manipulated powder.

Surely, we try to sell to these markets! But it is impractical, if not really impossible, to serve many special qualities on an import basis, and our share of it is small. Credit for using our iron in these fields belongs to the buyer rather than to us, as he has shown he can make use of a reduced, standard, low priced iron, with the public as the beneficiary.

Compacted parts field? What is the competition in this field? We, against domestic producers? No! All of us against (a) machined castings, (b) one part against several assembled parts, (c) special applications hitherto produced by other fabricating technique.

How big is the machined castings field? How big is the field wherein the clever fabricator can replace several assembled parts (made by another technique) with one part made by powder metallurgy technique? We cannot tell—but it is *BIG!*

Its growth today is limited not by the facilities for the making of iron powder, but by such factors as the availability of a sufficient number of suitable presses, furnaces, etc. Not the least is it limited by parts designers not yet understanding this new technique and by availability of compacted parts salesmen.

Economic Considerations

How does one develop this potentially large market? One of the factors is, of course, to put a suitable and rightly priced raw material on the market, which enables the powder parts fabricators to compete with the other techniques in making such or similar parts.

We did. In doing so we did not "capture half the market" as said by IRON AGE. We developed it, beyond what it was. Or are we over-estimating our contribution?

In defense, if defense is needed, we can point to a number of applications now going, which are economically possible only on our price in competition with former cast iron parts.

When the price was set at the end of the war, it was with the expansion of iron powder business from "yards to miles" in mind, and regardless of the then current domestic price for iron powder.

Preceding this decision, however, were careful calculations as to cost of production of iron powder here, provided the market was large enough. Without revealing our own figures, we can refer you to one of our associate producers of iron powder here, who in "Proceedings, Second Annual Spring Meeting, Metal Powder Assn.," said: "I feel safe in predicting, however, that the costs would be sufficiently low to establish prices on standard, run-of-mill good grades of powder, in the vicinity of 5¢ per lb. This is assuming, of course, that material costs and labor rates remain at or near present levels."

Assisting U. S. Market?

If what he said be true, are we "threatening" the domestic iron powder industry? Or are we assisting it

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There are two good reasons why we stress Gordon Quality and Gordon Service. (1) The precision quality of Gordon Thermocouple Extension Lead Wire is based upon 32 years of experience in careful selection and inspection to meet rigid insulation requirements. (2) Gordon's Chicago and Cleveland plants carry complete stocks of Thermocouple Extension Lead Wire for practically every application. (See illustrations below.) This means that your order gets immediate delivery of a QUALITY product—one that meets Bureau of Standards Specifications. ORDER NOW! No waiting or delay. Prices available upon request.

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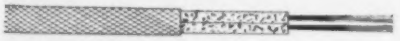

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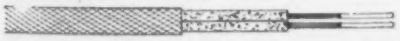

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DEAR EDITOR

Continued

to attain the volume it needs to produce at low prices!

As long as cases are mentioned, why not give the whole story, if the facts were available to IRON AGE!

One of the producers mentioned started to market an iron powder during the war. It was a good iron, favorably received by the fabricators. The raw material was detinned cans, oxidized to provide pure iron oxide, which was then reduced. That procedure involves quite a bit of handling, and the iron was expensive.

We believe the company saw this picture and withdrew from the market for that reason, rather than from our position in the field.

The other company started to market electrolytic iron powder in 1947. When they stopped production (to revamp their process?) they decided to produce reduced iron powder in a furnace designed for the annealing of the electrolytic iron. It did not work out too well.

Hoeganaes Experience

Against these somewhat spotty in and out attempts, stands the Hoeganaes people's 40 yr of continuous experience in direct reduction of iron ore to sponge iron. This was at first a raw material for steelmaking, and for the last 21 yr for the very slowly developing iron powder metallurgy industry.

At least two domestic producers appear to have found their market, and are today producing more iron powder than they did in 1946 in spite of the presence of the Hoeganaes product on the market.

Both of them have publicly or privately stated they can compete with our price today or even lower when the volume is large enough.

After the in and outers have left, there will be these serious and able domestic producers. There will also be some others, new ones, and they will be basing their production on basic raw materials, handled in volume.

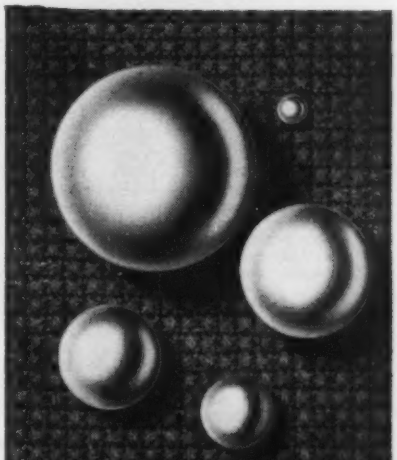
Will the Swedish product also be present when the volume gets really large? We believe so.

Plan Domestic Plant

When the imports of Swedish powder began again after the war, plans were also developed for a domestic plant, small to begin with, but capable of rapid expansion to volume production in case of a crisis in overseas transportation.

The execution of these plans had to be delayed on account of the shortage of dollar exchange in Sweden. Within the last month this difficulty has been overcome, and active preparations have started, with a view of beginning construction in the early spring.

a metal ball PROBLEM?



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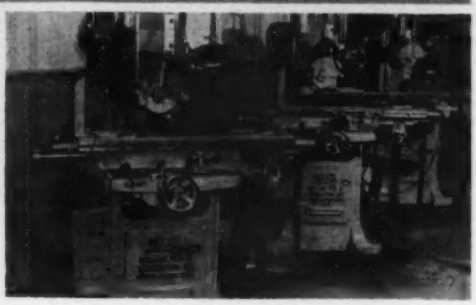

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You will appreciate the micro-inch finish produced at production speeds on Grand Rapids Grinders. All Grand Rapids Hydraulic Feed Surface Grinders have these outstanding features:

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DEAR EDITOR

Continued

The decision has been confirmed after the devaluation of Swedish currency. It does not appear that the contention that U. S. labor costs 4 times the Swedish rate would deter the Hoeganaes people.

Furthermore, is this labor rate estimate correct? And what about production per man-hour? Also, do you know how very much cheaper fuel is here than in Sweden?

All the facts given you for the article, and the technical opinions expressed, put together slightly differently, could conceivably have inspired the headline: "Domestic Iron Powder Industry Assisted!"

N. K. THOLAND
President
Ekstrand & Tholand, Inc.
New York

STEEL CONSUMPTION

Could you let me have a copy of your "Steel Consumption Study" for use with my Market classes?

GAIL MURPHY
Professor of Marketing
The American Institute for Foreign Trade
Phoenix, Ariz.

A copy has been sent.—Ed.

TAPER MILLING

We are writing to request that you send us a copy of the article entitled "Taper Milling Aircraft Parts," which appeared on p 92 of the July 14 issue.

OTTO A. DWORAK
Materials Mgr., Airplane Div.
Curtiss-Wright Corp.
Columbus, Ohio

Discusses Diesel Locomotives

La Grange, Ill.—At a press party held here at the plant of Electro-Motive Div. of General Motors Corp., C. R. Osborn cited before a large group of American railroad executives improvements made in recent years which have lengthened the life of diesel locomotives. During the day Electro-Motive also publicly announced three new models of diesel locomotives that will be put in production late this year.

Seidelhuber Enlarges Plant

Seattle—Seidelhuber Iron & Bronze Works, Inc. will erect a 40 x 24 ft addition which will double the size of their No. 2 plant and represents a start in its $100,000 expansion program according to Frank J. Seidelhuber, president. At completion of this program all operations of the company will be centered here.

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• *News of Industry* •

Canadian Production of Iron, Steel Shapes Shows Sharp Drop

Toronto—Canadian production of primary iron and steel shapes for the month of July 1949 totaled 259,887 net tons as compared with 321,401 tons in June and 276,260 tons in July 1948. Output for July included 253,898 tons of carbon steel shapes and 5984 tons of alloy steel shapes.

The following table shows production and shipments for sale of primary iron and steel shapes for the month of July, in net tons:

	Carbon Steel	
	Made	Shipped
Billets, etc., or forging	4,252	1,855
Other semifinished shapes, not for rerolling by makers	47,805	5,172
Structural shapes and piling	15,881	15,243
Plates	12,584	13,226
Rails	22,717	19,553
Tie plates and track material		
Splice bars	518	895
Tie plates	3,120	3,230
Spikes	702	882
Concrete reinforcing bars	8,351	6,985
Hot-rolled bars for cold-finising	1,270	....
Other hot-rolled bars	27,710	25,954
Pipes and tubes	15,027	16,651
Wire rods	17,052	17,821
Hot-rolled black sheets	15,774	12,335
Cold-reduced black sheets	9,808	7,942
Galvanized sheets	8,052	7,174
Steel castings	5,195	5,089
Miscellaneous hot-rolled products	22,199	2,807
All other products	15,881	14,700
TOTAL	253,898	177,514

Producers' shipments of primary iron and steel shapes subdivided according to principal consuming industries for the month of July, in net tons follow:

	CARBON STEEL	ALLOY STEEL
Automotive industries	6,283	3,092
Agricultural, including farm machinery	7,843	22
Building construction	24,792	39
Containers industry	15,094	2
Machinery and tools	7,251	440
Merchant trade products	21,732	130
Mining, lumbering, etc.	5,943	397
National defense	86	...
Pressing, forming and stamping	10,910	18
Public works and utilities	1,705	66
Railway operating	22,950	115
Railway cars and locomotives	12,370	32
Shipbuilding	986	34
Miscellaneous and unclassified	858	73
Wholesalers and warehouses	25,878	85
Direct export		
(a) to British Empire	6,406	...
(b) to other countries	6,427	599
TOTAL SHIPPED FOR SALE	177,514	5,144
Producers' interchange	70,444	655

No. 308-7PD Littell Heavy Duty Continuous Straightening Machine shown with No. 5 Automatic Centering Reel. Capacity, 1/8" x 8" wide coiled steel.

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STRAIGHTENING MACHINES

HERE are five sound reasons why you do *better, faster* pressroom work with Littell Straightening Machines:

1. They permit neater work and prevent jamming, by taking the last vestige of curvature out of coil stock.
2. They speed up and simplify feeding to the press. The variable speed drive unit starts and stops automatically.
3. They are easier to adjust. Upper rolls raise and lower individually or as a unit, and fit a wide range of gauges.
4. They are longer-lived — hardened steel rollers ground to close tolerances, mounted on anti-friction bearings.
5. They are safer — moving parts guarded, base fully enclosed.

Smaller machines such as our No. 308, 9½" wide, model can be supplied promptly. Investigate Littell straightening machines and other fine pressroom equipment—today!

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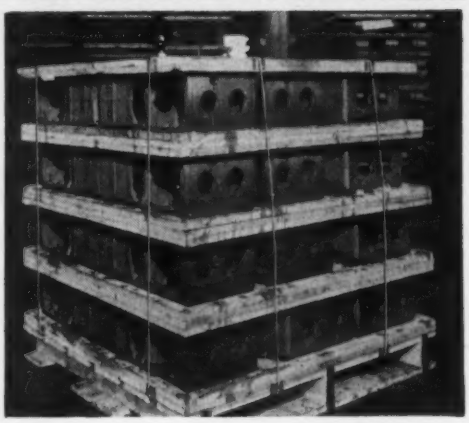
4119 RAVENSWOOD AVE., CHICAGO 13, ILL.

Transmission cases securely bound to pallet with Gerrard 10 gauge Round Steel Straps. (Photo by International Harvester Co., Industrial Power Division.)——►



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GERRARD

The use of Gerrard Round Steel Strapping will cut your material costs 30 to 50 percent.

The simplicity of Gerrard Steel Strapping operations will speed up binding and packaging procedures. Every Gerrard machine tensions the strapping, forms its own twisted seal, trimmed smooth with no exposed ends.

And the Gerrard method gives unrivalled protection. Packages are securely bound into rigid, pilferproof bundles. In crates, cartons, palletized loads, and carload lots of steel pipe, sheets and machinery, torsional sway is practically eliminated and damage claims are sharply reduced.

Gerrard Round Steel Straps come in a wide range of gauges to satisfy every commercial and industrial need. Gerrard Engineers will gladly help you solve your packaging problems. Their services are available *free of charge.* Write for our free books, *Blue Book of Packaging* and *Red Book of Carload Stowage.*

GERRARD STEEL STRAPPING COMPANY

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4705 So. Richmond St., Chicago

USS UNITED STATES STEEL

Electronic Tube Enables AC Current to Drive DC Motors

Pittsburgh — After nearly 20 years of experimentation, Westinghouse Electric Corp. is just about convinced that an electronic tube, used during the war to help speed production of aluminum and magnesium, will make it possible to use alternating current to run direct current driving motors of railway cars and locomotives.

The tube, called an "Ignitron," uses a small pool of mercury and a graphite electrode to convert alternating current into direct current instantaneously, thus enabling a railway car or locomotive to use 60-cycle current from a regular alternating current transmission line and still retain the benefits of direct current driving motors.

Business Leaders Optimistic

Chicago—Forty business leaders in the metal trades industry have expressed an optimistic view for business prospects in the coming year. At a poll taken at the golden anniversary convention of the National Metal Trades Assn. in the Palmer House, the majority said they believed business would range from fair to good, one thought conditions would be excellent while one other expects poor business conditions.

Concerning production and employment, however, the vote was almost two to one against 1950 equaling 1949 in total production and overall number of employees at work. Most troublesome problems facing management next year, according to the poll, were threatened strikes and forthcoming Congressional elections, lack of some materials, waiting attitude on the part of buyers, socialistic trends and the high break even point resulting from lower business volume.

The executives expressed the opinion that the greatest thing the government could do to assist industrial prosperity during 1950 would be to reduce spending.

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BLAST CLEANS CHEAPER
with the right equipment for every job

• *News of Industry* •

Canadian Pig Iron And Ferroalloy Output Declines

Toronto—Canadian pig iron production for July 1949, at 175,381 net tons, dropped sharply from the month immediately preceding and also from the corresponding month last year, but overall production for the first 7 months this year was at an all-time high record for the Dominion.

Production of ferroalloys in July amounted to 14,280 net tons compared with 19,264 tons in June and 12,939 tons in July 1948. For the month under review production included by tonnage ferrosilicon, silicomanganese, ferromanganese, ferrochrome, chrom-X and ferrophosphorus.

Following are monthly comparative production figures for pig iron and ferroalloys for 1949 in net tons:

MONTH	PIG IRON	FERRO-ALLOYS
January	183,074	21,931
February	172,724	21,713
March	202,130	22,457
April	180,740	24,427
May	202,148	20,650
June	194,255	19,264
July	175,381	14,280
Total 7 Months	1,310,452	144,724

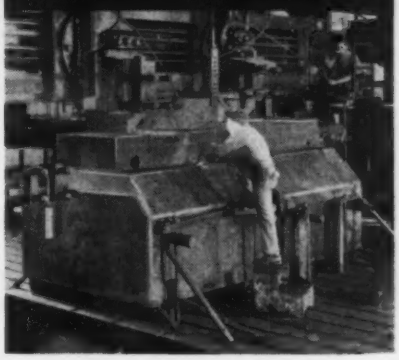
House Requires 3½ Tons of Steel

New York—The construction and equipment of a modern six-room home may consume nearly 3½ tons of steel products, according to the American Iron & Steel Institute.

For example, as much as 1800 lb of steel lath may be used to support the plaster walls of a six-room dwelling. Another large item is the steel pipe for gas, water and heating purposes, totaling about 1200 lb. Radiant heating, if included, would add about 1½ tons to that total of pipe.

Nails and miscellaneous wire account for about 600 lb of steel, while gutters and downspouts take approximately 475 lb. Flashing and miscellaneous sheets used for protective purposes may take 200 lb, while such steel hardware as locks, knobs and hinges can account for 90 lb of steel.

"Umpteen" Sizes of MACHINED CASTINGS your problem?



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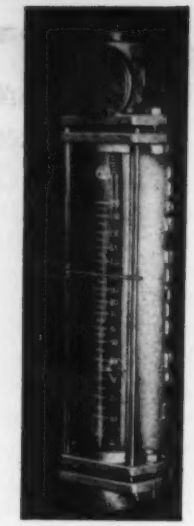

A visual, continuous indication of flow rate is provided by A.G.F. Flow Meters. Rate of flow is read directly in cubic feet per hour. Any change or interruption in the flow is immediately evident. Units are available for practically all gases used in industry, and many liquids. Gas capacities range from 1/4 to 3000 cubic feet per hour.

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CLARK BROS BOLT CO. MILLDALE, CONN.

FATIGUE CRACKS

Continued from Page 22

Saturday Review of Literature and *Atlantic Monthly* are not mentioned.

Profit and Loss

Way back in 1905, M. D. Hubbard Spring Co. of Pontiac, Mich., began advertising in your favorite family journal and even fell into the habit of reading it.

Soon the pages of wisdom so entranced the principals of the firm that they clipped them out to save for future guidance.

The other day, P. M. Hubbard found an article in the files dated Sept. 21, 1905, which related principles so basic that it had withstood 44 years of previous housecleanings. Entitled "Factory Cost and Business Methods," it pointed up the necessity of keeping accurate and complete cost records and told how to set them up.

In earlier years, before competition set in, manufacturers had used the "old horse" method of costing. This involved securing as nearly as possible direct labor costs on an article, adding the cost of materials, then guessing at a percentage to be added to cover overhead. This latter was familiarly called "the old horse."

In the goldfish bowl atmosphere in which business is conducted today, with annual financial statements having become an agent of public relations policy, one recommendation of the article clearly shows its age:

"The key to the whole system of accounts should be the private, or controlling ledger. The one designed by the writer consists of a locked book, keys to fit which are given only to the officials and auditor (who makes the entries), thus securing the confidential nature of its contents."

About the same period, we understand, the bosses' records of your f.f.j. had a secrecy device much safer than locks. Entries were made in Sanskrit.

Most Mentioned

Basking in reflected glory during the steel strike, when it was the magazine most quoted over the air and in the press, your favorite family journal was brought up with a rude shock by one newspaper which quoted it liberally. Immediately following the strike article was a short "filler" item:

> Iron Age Began in 1000 B.C.
> The Iron Age began about 1000 B.C., the date varying in different localities.

Resume Your Reading on Page 23

UNIVERSITY OF MICHIGAN LIBRARIES

Consumers Reported Easing Pressure on Steel Warehouses

Warehouse inquiries drop 15 pct . . . Some items in short supply.

Cleveland—While many of the nation's top steel consumers laid plans to halt manufacturing operations because of the growing steel shortage, steel warehouses here reported an estimated 15 pct drop in inquiries and orders recently.

This paradox apparently stems from the fact that the stampede on steel warehouse stocks when the strike got under way was to complete work already in the shops, and to halt operations until the strike is over and a supply at mill level assured.

In this area, steel warehouse inventories of the popular sizes in structurals, plates and hot-rolled sheets, are now almost at the bottom of the barrel, but bars, bar shapes and most alloy products are in good supply.

Some Bought Back Stock

Some warehouse operators here have been able to add to their stocks since the start of the strike by the simple expedient of buying back tonnages from over-stocked consumers, particularly in the capital goods industries, including some earth-moving equipment producers, car builders and others where steel inventories had accumulated to the point where they could no longer be justified by new business in sight.

Also, some automotive parts suppliers have been cut back on production of certain components and have reduced their requirements commensurately.

Demand for certain alloy, cold-rolled and hot-rolled products had tapered off sharply, and trade sources report that tonnages of alloy and some cold-finished products are being offered at mill price in an effort to liquidate inventory.

The spread of steel product tonnage available from warehouses which had no inventory problem when the strike began varies substantially. One warehouse reports a good stock of plates; another, bars and bar shapes, etc.

Alloy products are generally in good supply. But there has been some tightening of flat-rolled stainless products recently.

A few of the smaller warehouses report that order volume is not off because of demand, but that the tonnage is off and the orders smaller because stocks are incomplete.

As a fillip to trade sources predicting a tremendous boom in the steel markets, both mill and secondary, when the strike ends, 3000 tons of carbon plates were offered here (since the strike began) at 4.50¢ per lb and the entire tonnage moved at that price.

Also, an alumnus of the recent conversion school had an estimated 8500 tons of $90 ingots on his hands when the strike started. This tonnage has been sold since the strike started on an agreement that it will be rolled as soon as the strike is over. Mill space was probably more important than the ingots.

July Ingot Production Drops to a New Monthly Low

Toronto — Canadian production of steel ingots and castings in July fell to the lowest monthly total for the year. For July output amounted to 238,830 net tons, and compares with 270,455 tons in June, and with 244,872 tons in July 1948.

For the first 7 months of this year cumulative production of steel ingots and castings totaled 1,914,871 net tons, which compared with 1,840,468 tons for the like period last year.

Following are comparative monthly production figures for 1949 in net tons:

MONTH	STEEL INGOTS	STEEL CASTINGS
January	275,987	8,720
February	249,009	10,262
March	287,885	10,576
April	260,319	9,649
May	283,808	9,371
June	261,476	8,979
July	232,499	6,331
Total 7 Month	1,850,983	63,888

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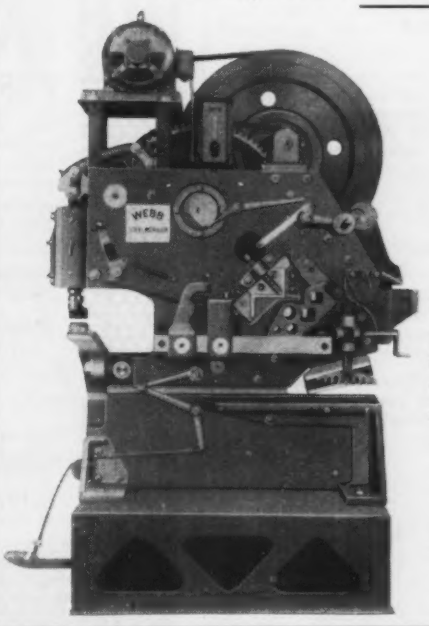

1 Punch for plate, bars or structurals.
2 Cuts angles and tees with straight or miter cut.
3 Cuts off round and square bars.
4 Shears plates and bars.
5 Coping or notching attachment.

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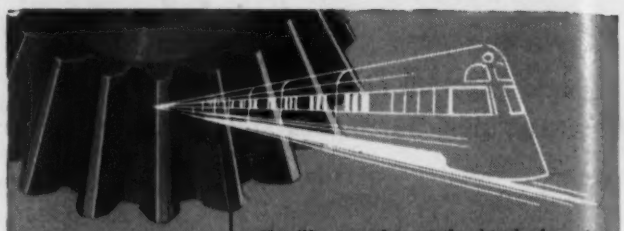

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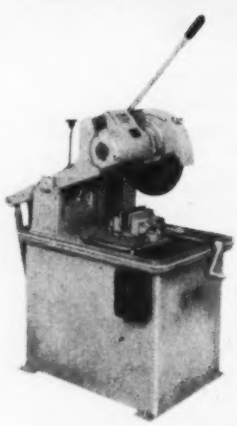

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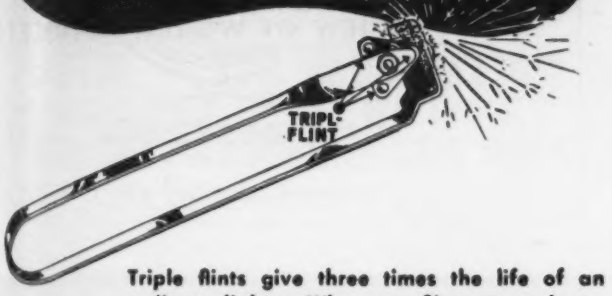

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GLOBAL LETTER
REVIEW OF WORLD MARKETS

Continued from Page 28

And since the industry, if faced with financial difficulties, can draw on the inexhaustible resources of the state, there is no spur to efficiency.

Closer scrutiny by Parliament of the accounts of nationalized concerns, such as has been suggested recently, would bring further difficulties in its train, for it would lead to a still closer identification of the Minister with the publicly-owned undertaking and to greater Ministerial intervention in its work.

Secondly, there is no effective control from the consumer's point of view. The government cannot easily reconcile its interest in the ownership of an industry with its duty of protecting the consumer.

Finally, in the field of industrial relations the presence of a trade union leader on the board of a state-owned undertaking, and his resulting association with the owner's standpoint means the severance of all ties between him and his followers. A strain is in consequence placed on trade union discipline and not a few recent unofficial strikes have been caused by this fact.

Board's Judgment Impartial

None of these difficulties arose, however, in the case of the Iron and Steel Board. The board was an authority whose impartiality was above suspicion, because, unlike a Minister responsible for a nationalized undertaking, it had no owning interest in the industry it looked after. It was neutral in balancing the plans of the steel industry against those of other industries; in judging between the claims of certain firms or sections within the steel industry and those of other sections; in adjudicating between the interests of the industry and those of the consumer.

It was a body on which labor and the public were represented in their own right, without the compromise of loyalty to his following which must result when a trade union leader is placed on the managing board of a state-owned concern.

It was also a board which had effective efficiency checks. It dealt with competing com-

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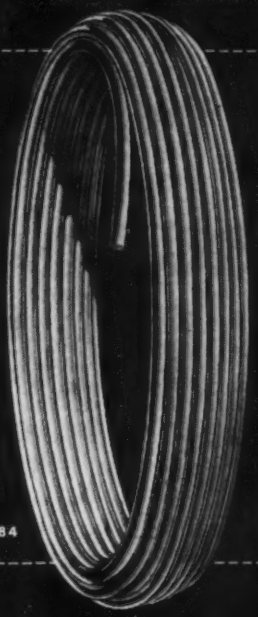

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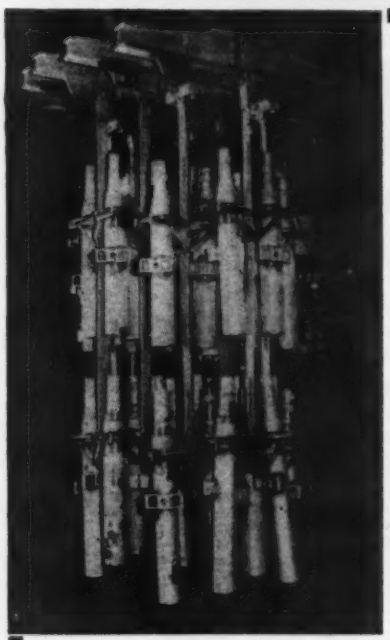

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Continued

panies whose costs were open to examination by its experts. It had power to fix their profit margins. And it could so adjust these that an inefficient firm could be forced either to improve its methods or quit.

In short, the board exercised a more effective control over the iron and steel industry than has been secured by the public over the industries now publicly owned. And just because its impartiality was beyond doubt it had a greater moral authority than a state-owned undertaking can ever have.

Currency Policy Affects Demand For Belgian Iron and Steel Products

Brussels—The Belgian company, Metallurgique d'Esperance-Longdoz, points out in its latest report that from July 1948 to February 1949 demand for iron and steel products was constantly growing. Output followed demand and reached the highest level of prewar years.

But beginning in March 1949 the trend suddenly reversed. The paralyzing effect of currency policy on international trade is blamed for this. The result was that exports fell and that means of payment are still limiting purchases by foreign countries. Under increased competition, export prices have decreased.

Belgian home steel prices are maintained at an artificially low level through government intervention and no longer find compensation from export prices, the report states. The report urges a more realistic approach on the question of prices.

Says Britain Loses on Auto Exports

London—The House of Commons was told recently that all Britain's export trade in passenger autos to the United States is carried on at a loss. The statement was made during the debate on the government's proposal, which was carried, to increase the profits tax from 25 pct to 30 pct.

Answering Socialist arguments that industrial profits could well take care of this increased tax, Sir Peter Bennett, Conservative M.P. for Edgbaston, Birmingham, and chairman of a firm of motor accessories manufacturers, said that motor car companies had authorized him to give these details:

Ford has not even covered the full cost of their dollar export business in North America, let alone any profit in the U. S. Austin has not covered the full costs of its overhead. Hillman do not make their full factory costs on the cars they sell to the U. S. Morris take losses on all cars sent to the U. S.

Resume Your Reading on Page 29

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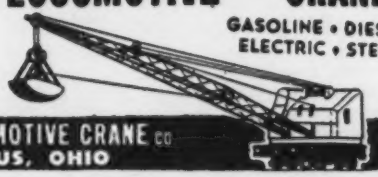

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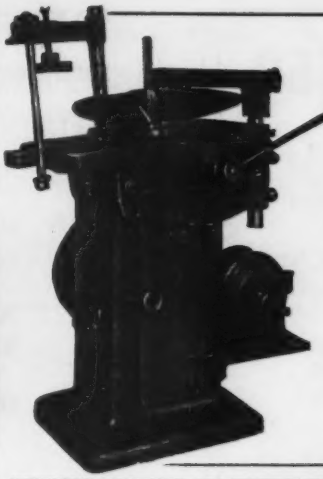

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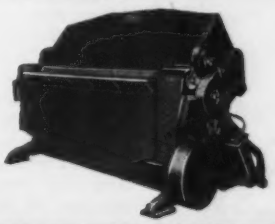

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42" x 24' c/c N-B-P Lathe, M.D.
24" x 168" c/c Sidney 16 sp. Lathe, 1942
16" x 54" c/c American Pacemaker, 1942
3—#26 Kempsmith Universal Millers, 1944
#4 Cincinnati Plain Hi-Power Miller
54" Colburn-Consolidated Vert. Bor. Mill, PRT.
36" Rogers Vertical Turret Lathe, 1942
#1-18, #3-24 Cincinnati Prod. Millers
#5 Gisholt Turret, bar & chuck, 1943
14" x 36" Landis Universal Grinder, 1942
12" x 36" Norton Universal Grinder, 1941
6" x 30" Norton Plain Grinders
5" Sellers Horiz. Mill, 12'6" to brg., 1943
16" American V-ram Shaper, M.D.
24", 12" Dill Trav. Hd. Slotters
30" x 30" x 8' N-B-P Planer, direct M.D.
24" x 24" x 4' Liberty Shaper—Planer, M.D.
7" Peerless Hydracut Saw, 1942
#6 Mitts & Merrill 3½" Keyseater
6000# "Pneumatic" Air Drop Hammer, 48" x 60"
#2B Nazel Hammer, M.D.
4" Oster "Rapiduction" Pipe Threader

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LATE TYPE MACHINERY

BORING MILLS, 84" & 72" Cincl.; 42" & 36" King; 36" Bullard; 61" Bullard Maxi-mil
BORING MILL, 42" King, 2 hds., P.R.T., M.D.
BORING MILLS HORIZ., 2½" #25T G. & L. Table; 4" Univ. Table; 3½" bar Landis Floor; 3" bar Yoder Table; #32 Lucas, 3-3¼" bar
CRANE, 30 ton Cyclops, 50' span, '43
LATHE, 60" x 45' cen. Mackintosh Hemphill, '42
LATHE, 59" x25' centers Wickes, 1943
LATHE, 48" x 20' cen. Simmons Brd. Hd., '42
LATHE, 36" x 32' bed N.B.P., 2 carr., T.A., M.D.
LATHE, 30" x 20' Centers, Axelson, T.A., Late
LATHE, 30" x 18' cen. Lehmann, T.A., 1943
LATHE, 22/46" x 12' Putnam, gap
LATHE, #4B LeBlond Boring, 29" sw., capty. 28" x 4½", '42
TURRETS, #1A & #3 W. & S. Univ. Late
TURRET, #4 Gisholt Univ. Bar, 1942
GRINDER, 20" x 72" Landis Hyd. Cyl., M.D.
GRINDER, 20" x 36" Landis Univ. Hyd., Late
GRINDER, 10" x 36" Norton Hyd. Surface, '43
GRINDER, 12" x 24" G. & L. #45 Surface, '42
GRINDER, #70A Heald Internal, '42
GRINDER, #174 Heald Gap Int., 54" swing, '42
GRINDER, Cinci. Monoset T. & C., '43
GRINDER, SURFACE, 30" x 120" Hanchett Hor.
KEYSEATER #6 Mitts & Merrill, Capty. 3½"
PLANER, 42" x 18" x 16' N.B.P. Frog Switch
PLATE PLANER, 30' x 1", Cleveland, M.D.
SLOTTER, 48" N.B.P., grd., late
SLOTTER, 20"-24" Dill, AC, M.D.

MILLING MACHINES

BL-2416 Keller 1942
Nos. 4K & 3K K & T, Pl., Late
No. 3 Cinci. Dial Type Plain, Late
No. 3H K. & T. Plain (2), 1942
No. 36 Van Norman Ram, 1943
No. 2G Kempsmith Univ., M. D., 1943 (3)
No. 2M Cinci. Plain, M.D.
No. 2MH Cinci Plain, Late (2)
No. 4 Kempsmith Maxi-Mil Vertical
No. 9J Gorton Elect. Duplicator, Late
48" x 56" x 18' Inger., planer type, 3 hds.

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CABLE ADDRESS—Benmachine, New York

THE CLEARING HOUSE

NEWS OF USED, REBUILT AND SURPLUS MACHINERY

MDNA executive director leaves

Ohio area sees large potential demand

New dues plan passed by New York MDNA chapter

History of lathe available

R. K. Vinson Leaves MDNA

Chicago—R. K. Vinson, executive director of the Machinery Dealers National Assn. for the past five years, resigned his post effective Nov. 1. Mr. Vinson has founded a new organization, Research Institute for Used Machinery and Equipment Dealers. This institute has been started to help machinery dealers merchandise their products and to make studies of all phases of the dealer business, such as selling, accounting, promotion, and advertising. The institute plans one national dealers' conference annually for lectures and seminars on all the various phases of business management and sales as they pertain to used machinery. The address of the new organization is 6838 Osceola Ave., Chicago 31.

Ohio Sales Off But Inquiries Predict Large Potential Demand

Cleveland—While inquiries for used and rebuilt machine tools indicate a large potential demand, since the start of the steel strike more than a month ago, dealers report sales are off. Most dealers are in stock condition. While there is plenty of inventory, none of it is distressed.

Dealers find it difficult to buy certain types of machines, particularly standard, general purpose machines, tool room equipment, planers and boring mills for stock. High production machines, including some automatic screw machines and certain cylindrical grinders, are more readily available.

According to dealers, the major reason equipment is difficult to obtain is its high cost of replacement, in spite of the fact that good, late-type machines bring high prices in the used market.

Auction Prices High

The auctions and plant sales, which some dealers use as barometers of the used machinery market, are attracting direct purchasers who either come themselves or send dealers to buy. As a result, prices at most of the auctions are too high for dealers buying for stock.

Biggest source of machines, dealers find, are plants where a major change in production or end product has been made, or old plants going out of business.

The problem of getting machines at a reasonable price is acute for the rebuilder. Many companies are leaning toward rebuilt equipment, but rebuilders find it difficult to obtain the caliber of machines suitable for rebuilding. Either the machines do not require rebuilding and are bringing a high price, or they are not worth rebuilding.

New York MDNA Chapter Meets

New York—The New York chapter of MDNA at its regular monthly meeting Oct. 31 reported the new plan adopted by the association, subject to the approval of

Turn to page 200

MDNA CHAPTER MEETINGS

CHAPTER	DATE	TIME	PLACE
Chicago	Thurs. Nov. 17	6:30 p.m.	Steak House
New York	Mon. Nov. 28	6:30 p.m.	Cavanagh's
Philadelphia	Tues. Nov. 29	6:30 p.m.	Warwick Hotel
Los Angeles	Tues. Nov. 29	6:30 p.m.	Elks Club
Detroit	Tues. Dec. 6	7:00 p.m.	Hotel Ft. Shelby

SIMMONS NEWS

ENGINEERED Machine Tool REBUILDING

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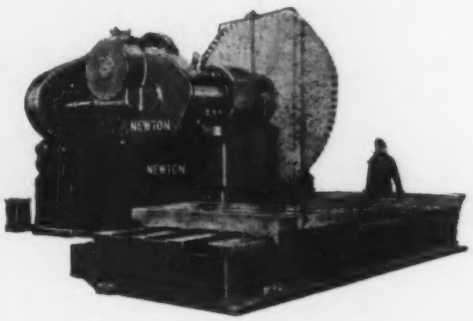
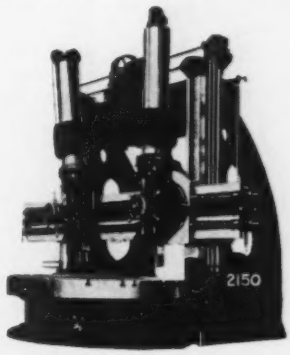


120" NEWTON (Consolidated) Type U-97-A Heavy Duty Cold Saw. Hydraulic Feed, capacity round 44", square 42" x 42", 75 H. P. Main Drive Motor. Inspect at Albany.



84" BETTS Heavy Vertical Boring and Turning Mill, 2-swivel heads on rail. Ring counterbalanced rams, P. R. T. Approximate Weight 60,000 lbs. Inspect at Albany.

Write today for Complete Current Stock List of Simmons Engineered-Rebuilt Machine Tools

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Reed-Prentice No. 1½G Die Casting Machine.
Fisher Body Type P-125A Welder.
H.P.M. 100-ton Hyd. Press, Model 10-9SL.
South Bend 14½"x6' Toolroom Lathe, 1947.

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30' x 1" Cleveland

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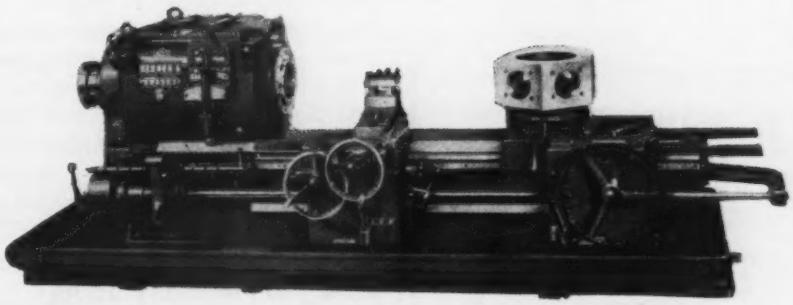
8" bar capacity . . . Power chucks



#4A Warner & Swasey Universal Heavy Duty Turret Lathe, *Serial number over 1,000,000;* power rapid traverse; arranged for bar and chucking work; 24" 3-jaw universal chuck with M.D. power chuck wrench; AC motors and controls; assortment of tooling. ***PRACTICALLY NEW!***

(2)—#4A Warner & Swasey Turret Lathes, Serial Nos. over 500,000; power chuck; rapid traverse; AC motors and controls. EXCELLENT CONDITION. STILL UNDER POWER.

Also, #3, #4 Warner & Swaseys; #4, #5 Gisholts.

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BORING MACHINES

2½" No. 25T Giddings & Lewis
3" No. 3A Universal
3¾" No. 32 Lucas
5" Jones planer table type
52" King vertical
100" Niles-Bement-Pond vertical
No. 2112 & 112B Excello precision
Nos. 42, 47A & 48A Heald Borematic

DRILLS

20" No. 2 Mfg. Colburn
20" Cint. Bick. Super Service Mfg.
21" Canedy Otto
21" & 24" Cinti. Bickford
24" Kokomo
24" Cint. Bick. Super Service
No. 217 Baker 3 spindle
Nos. 121, 310, 315 & 513 Baker
No. 30HO Baker
3', 10" Morris radial
4' 11" Cint. Bick. Universal radial
4' Hammond radial, elbow arm
6', 15" Dreses radial
16" Allen 6 spindle, No. 2
24" Demco 4 spindle, No. 3
24" Foote Burt 6 spdl., No. 2
24" Allen 4 spdl., type 2K H

GEAR MACHINERY

Nos. 3 & 12 Barber Colman
Types A & T Barber Colman
Nos. 6 & 72 Fellows
Nos. 8H, 12H, 16HS & 18H Gould & Eberhardt
Nos. 1, 5A & 5AC Lees Bradner
No. 130 Cleveland Rigid hobber
No. 5M Adams Mfg. hobber and spline miller
3" Gleason spiral bevel gen.
No. 7 Gleason cutter grinder
18" Gleason testers & lappers
No. 8M Fellows Red Line Checker
24" Flather auto. spur
8"-12" Red Ring shaver
8" Red Ring lappers
Barnes Hut-O-Lap lappers
No. 4 Cimatool rounders

GRINDERS

6"x18", 10"x18", 10"x36", 10"-14"x72" & 16"x36" Norton
4"x18", 6"x18", 10"x18", 10"x24", 14"x36" & 16"x72" Landis
6"x18" & 6"x32" Brown & Sharpe
Nos. 1, 2 & 13 Brown & Sharpe univ.
10"x24" Landis universal
26" No. 226 Gardner disc
53" No. 372 Besly horiz. disc
30" No. 230 Hanchett opposed disc
16" No. 214 Hanchett opposed disc
15" No. 115 Gardner opposed disc

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14"x6' Lodge & Shipley
16"x6' Monarch
16"x10' American
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18"x8' Rockford
18"x12' Bradford
19"x8' Leblond
20"x8' Lodge & Shipley
25"x48" centers Leblond
36"x16' Bridgeford

LATHES, TURRET

Nos. 2, 3, 4, 1A & 3A Warner Swasey
No. 7 Bardons & Oliver
Nos. 2 & 3 Morey
Nos. 3, 4, 5, 3AL & 28" Gisholt
6. 2 Denver
No. 4 Midland
No. 3 Jones & Lamson
No 5 Foster
3"x36" & 4"x34" Jones & Lamson
24" & 36" Bullard vertical
No. 2FU Foster Fastermatic

PLANERS & SHAPERS

30x24x6' Liberty O.S. planer
20" & 24" Gemco shapers
16", 20" & 24" G&E shapers
24" Columbia Universal shaper
6" P. & W. vertical shaper

FORGING TOOLS

2" National Upsetter
4" Ajax upsetter
No. 1 Ajax forging roll
No. 5N Nazel air hammer
600 ton Hamilton forging press
⅜" Wat. Farrel OD SS cold header

MILES MACHINERY CO.
SAGINAW, MICH.

Continued from Page 196

the local chapters, regarding membership fees. Members will pay according to gross annual sales rather than according to the number of employees in their firms. The chapter went on record to adopt the new plan, effective June 1, 1950, with the amendment that the base year be the 12-month period ending May 31 to avoid confusion caused by different fiscal years.

The plan passed unanimously since members agreed that it was a more equitable method of assessing members and that it would net a larger yearly return. It was pointed out that most of the dealers would find their membership assessment less than it is now because of the size of their business. Larger dealers who will be assessed a larger proportionate share have shown their agreement by their overwhelming acceptance of the new plan. The additional revenue to be realized by the association will be used for publicity and promotional purposes.

Electrical Items On Government Orders

New York—Recent sales of rebuilt electrical equipment indicate that government contracts amount to a considerable proportion of the orders. One rebuilder of electrical apparatus reports that special items such as motor-generator sets for laboratory use have been the main items of government and army contracts while most industrial motors have not been moving.

History-of-Machinery Series

The early history and development of the lathe as a production tool is described in "Brief History of the Lathe," first of a series. Old prints from the Bettmann Archive and other photos illustrate the text. Also included is a partial listing of rebuilt lathes offered for sale by the company. *Botwinik Brothers of Mass., Inc. For more information, check No. C-1 on the postcard on p. 37.*

Resume Your Reading on Page 197

—LATEST TYPE—Nearly New—

MACHINE TOOLS

BORING MILLS—Horizontal
CINCINNATI GILBERT 3½" bar, floor type, latest
LUCAS #41, 3" bar, Table Type, "Precision", Latest
LUCAS #43, 5" bar, Table Type, "Precision", M.D.
NILES-BEMENT-POND 5", 8" bar, Floor type, M.D.
UNIVERSAL 3" bar, high speed, latest type

BORING MILLS—Vertical
BULLARD 12, 16", 6 spindle Mult-Au-Matic, Type D, single or double spindle, Latest Type
BULLARD 24", 36", 42" "Spiral Drive," Latest Type
KING 62", 2 swivel heads, PRT, M.D.
NILES 100", 2 swivel heads, PRT, D.C., Motor Dr.

DRILLS—Miscellaneous
AMERICAN 4' arm 11" col., "Hole Wizard", Latest
LELAND & GIFFORD #2 LMS 6 spindle, Latest
NATCO 4 AL 30 spindle, Multiple, Latest Type
PRATT & WHITNEY 1Bx50" Deep Hole, Latest

GEAR CUTTING EQUIPMENT
FELLOWS 61A, #61, #7, #7A, #72, #75, #77, #Z, #6Z2, High Speed Gear Shapers, latest type
GLEASON 3", 12" straight bevel generator, Latest
GLEASON 24", 37", Bevel Gear Planer, Motor Drive
GOULD & EBERHARDT 12H, 96H, Hobber, m.d.

GRINDERS—Cyl.—Plain & Univ.
BROWN & SHARPE #1, 2, 3, 4, Universal, Latest
BROWN & SHARPE #13 Univ. Cutter & Tool, Latest
LANDIS 4x12, Type H, Plain Hyd., Latest Type
NORTON 6x18", 10x72", 14x36", Type C, Plain, latest
NORTON 6"x30", 10"x36", type C, Pl. Hyd., latest

GRINDERS—Miscellaneous
BARBER COLMAN #3, 4 hob sharpener, latest type
CINCINNATI #2, #4 Centerless "Filmatic," latest
HEALD 75A, 72A3, 72A5, 74, Internal, latest type
LANDIS #12 Centerless, Hydraulic, Latest Type

GRINDERS—Surface
BLANCHARD #11, 16" Mag. chuck, Latest Type
HANCHETT Series 300, 12"x48" Vert. Sp. Hy., Latest
HANCHETT #36 Vert. 36" Mag. Chuck, Latest
HANCHETT Series 120 Piano Horiz., 30"x120", Latest
HEALD 25A—Rotary—16" and 30" chuck, hyd., latest
THOMPSON 12x12x24 Type B Hyd., Latest Type

LATHES—Engine & Mfg.
AMERICAN 36"x360" centers, 2 carriages, motor dr.
LODGE & SHIPLEY 14"x30", 16"x30" Centers, latest
MONARCH 10"x26" centers, Model EE Timken, latest
MONARCH 12"x30" Centers, 12x54" Centers, Model CK, Timken Bearing, Latest Type
MONARCH 22"x450" centers, 3 carriages, Timken Bearing, Model CM, motor drive
NILES 30x50" Boring, Timken, Latest Type
NILES 60"x55' centers, 2 carr., PRT, Latest
PRATT & WHITNEY 16"x30" Centers, Latest Type

LATHES—Turret
BARDONS & OLIVER #5, #7, Timken, Latest Type
FOSTER #4FU "Fastermatic", Timken, Latest
GISHOLT #1L, #2L, #3L, Universal, Timken, Latest
GISHOLT #3, #4, Univ., TIMKEN, Latest Type
JONES & LAMSON #3, #5 Univ., Timken, Latest
MOREY No. 2G, No. 3, No. 4, Timken Bearing, latest
WARNER & SWASEY #2A Univ., Timken, Latest
WARNER & SWASEY 4A Universal, Timken, Bar and Chucking (New 1947)

MILLING MACHINES—Plain
BROWN & SHARPE 2B, 3B, Timken, Latest Type
CINCINNATI 4-26, 2-18 Hydromatic, Simplex, latest
KEARNEY & TRECKER 1218, 1404, Latest type
KEARNEY & TRECKER 2H, 3H, 4H, 5H, Timken Bearing, Latest Type

MILLING MACHINES—Thread
LEES BRADNER 12"x54", Model HT, Latest Type
MOREY 12"x30" and 60" centers, Latest Type
PRATT & WHITNEY 6x60", Model C, Latest Type

MILLING MACHINES—Universal
BROWN & SHARPE 2A, 3A, Timken, Latest Type
KEARNEY & TRECKER 2H, Timken, Latest Type
VAN NORMAN #12, #26, #36, Timken, Latest Type

MILLING MACHINES—Vertical
BROWN & SHARPE #2B, Timken, Latest Type
CINCINNATI #2 Dial Type, Timken, latest type
GORTON #8D, #8½D, high speed, latest type
KEARNEY & TRECKER #2K, #3H, Timken, latest

PLANERS
BETTS (CONSOLIDATED) 84"x92"x16', 4 heads, Box Table, Power Rapid Traverse, D.C., M.D.
BETTS (CONSOLIDATED) 108"x84"x50', 4 heads, Box Table, Power Rapid Traverse, D.C., M.D.
NILES "Time Saver," 42"x42"x14', 3 heads, Rapid Traverse, A.C. vari-voltage drive, Latest
NILES 108"x84"x42', 4 heads, Power Rapid Traverse, Box Table, D.C. reversing motor drive

SCREW MACHINES—Automatic & Chucking
CONOMATIC 2¾"—6 spindle, Latest Type
GOSS & DeLEEUW 6"x6¾" Auto. Chucker, Latest
GOSS & DeLEEUW 8" Auto. Chucker, 5 spin., Latest

MISCELLANEOUS
BARNES #172, 306H, 307, 307B Vertical Hone, Hydraulic, Self-Oiling, Latest Type
CINCINNATI 1-30, 3-30, Duplex Vert. Surface Broach, Double ram, Model ER Hyd., Latest Type
CINCINNATI Series 300, ⅛"x8'6" Press Brake, MD
HENRY & WRIGHT 50 ton Dieing Press, M.D.
LAKE ERIE 500 ton Vertical Hydraulic Press, latest
MICHIGAN 1708, 1712 Universal Reliever, Latest
VERSON #206, 10 gauge x 96" cap. Press Brake, latest

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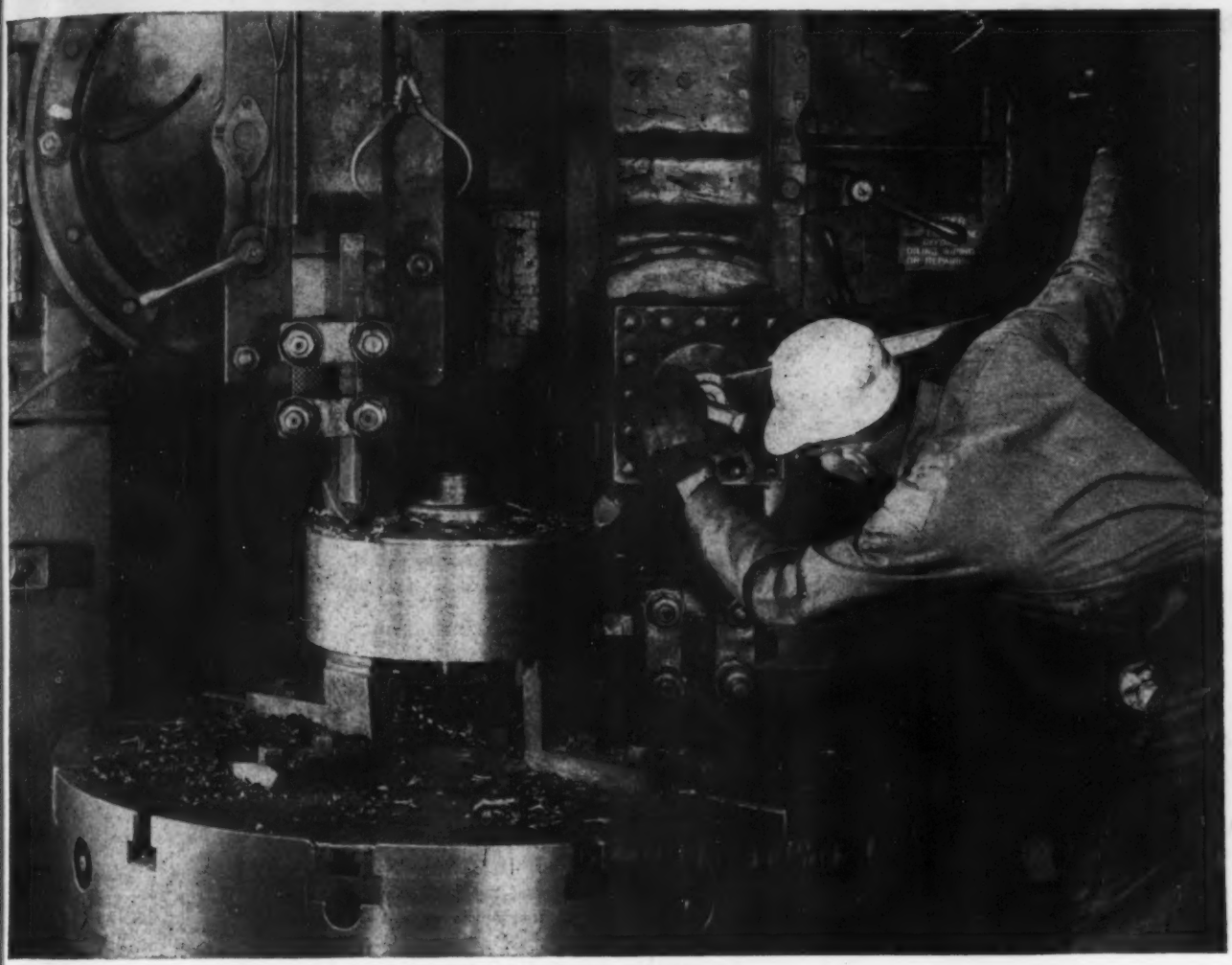

Sound from Rim to Rim

The way Bethlehem makes these gear blanks involves exceptional care, an assortment of skills, the use of selected steel, and the aid of unique machines. But it all pays off, for the finished blank you get is sound from rim to rim—a genuinely fine piece of work.

Bethlehem gear blanks are very strong. Because of this, thinner sections—with consequent savings in weight—are often possible. The blanks are available in carbon or alloy steel, treated or untreated; sizes range from approximately 10 in. to 42 in. OD.

In the manufacturing process, we use a mill that combines the operations of upsetting, forging, and rolling—a method resulting in homogeneity, good grain structure, nice surface. To save the customer time and expense, we rough-machine each piece, so that the blanks as shipped are in very good shape for the finishing steps.

They're excellent for spur, herringbone, bevel, and miter gears . . . sturdy, long-wearing, reliable. *And*—moderate in cost! For further details, request illustrated Booklet 216—or ask a Bethlehem man to call.

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